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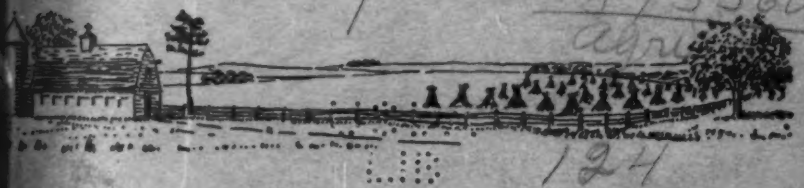

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The Farmer's Digest

Volume 6 May, 1942 Number 1

Good Pasture Returns Dividends

Condensed from Pennsylvania Farmer

Fred V. Grau

Pennsylvania State College

THE gospel of pasture improvement through the use of lime, fertilizer and manure has been carried far and wide by Pennsylvania State College's extension specialists. Until a relatively few years ago there was little actual information about the pastures which were being treated. The grass looked better but how much better was it? The cows grazed there most of the time, but how much more grass were they getting? Did it pay the farmer to spend money for lime and fertilizer?

These and many other questions have been answered in the last four years since county agents have put pasture cages in the farmer's own pastures. The lumber and chicken-wire cages, most of them home-made, protect the grass from being grazed. Every three or four weeks the cages are visited and if the grass is over four inches high it is clipped and weighed. The clipped grass is air-dried and weighed again. At the end of the season the clippings are sent to the college for analysis, together with the yield results. With the cooperation of the Departments of Agronomy and Biochemistry, the clippings are analyzed for protein, phosphorus and calcium. The following table represents the average of the yields and analyses for three years, 1939 to 1941 inclusive. Phosphorus and calcium were not run in 1939. The 1938 figures are not included because there were only a few cages in one county. During the last three years samples have been analyzed from every section of the state on all types of soils:

These results boiled down mean:

1. An acre of good pasture will yield protein equivalent to over three tons of choice alfalfa hay with the lowest possible cost for labor and materials.

Reprinted by permission from the Pennsylvania Farmer, Pittsburgh, Pa., Feb. 14, 1942

2. An acre of good pasture will furnish a cow with approximately 1000 pounds of protein; phosphorus equivalent to that contained in 250 pounds of 20% superphosphate; and calcium equivalent to that contained in 130 pounds of ground limestone (50% CaO).

The same cow on typical untreated pasture would have to eat all the forage (weeds and all) on six acres of land to get the same quantity of minerals and food value.

3. The value of the feed produced on one acre of good pasture approximates $60 to $70. The cost of producing this feed (lime, fertilizer and manure) is about $5 to $6 an acre a year. This supports our statement that "A dollar invested in pasture improvement yields 10 dollars in return."

This is the time when the farmers who have an abundance of good grazing lands will pat themselves on the back. The lime and the phosphorus that they have applied will continue to produce rich grass for several years. In the face of rising feed prices, shortage of labor and scarcity of certain materials, the farmer with lots of good grass will weather the storm. Land in good sod stays put—it does not erode. It improves steadily, the longer it is in sod. Good grass is double insurance against emergencies.

A separate evaluation of the analyses developed some interesting facts, supported by results from other sources. Briefly stated they are:

A high legume population in the pasture means: (a) High protein in the feed. (b) High levels of phosphorus and calcium in good balance. (c) High carrying capacity. (d) Abundant cheap nitrogen to feed the grass.

A high legume population is encouraged by: (a) Lime—enough to bring the soil almost to the neutral point. Excess lime is detrimental by destroying the proper balance with phosphorus. (b) Ample supplies of phosphorus and potash. About 200 pounds of 20% superphosphate is needed each year to replace that removed by grazing. The best pastures analyzed have received an average of 200 pounds of fertilizer a year for the past 5 years. Experiments show that added potash encourages legumes. (c) Occasional applications of manure at the rate of about 8 loads per acre. Manure furnishes nitrogen and potash in largest amounts and is most beneficial on poor sods. (d) Good grazing management which includes:

(1) Preventing heading-out and maturity of grasses by early and heavy grazing, or by clipping, or both. (Mature grasses are low in feed value.)

(2) Promoting more uniform grazing by fencing for heavier stocking and alternate grazing, and by scattering the droppings at intervals. Mixed grazing with different classes of animals promotes more uniform grazing.

High phosphorus in the forage is associated with: (a) High protein. (b) Ample available phosphorus in the soil. (c) Adequate supply of moisture (phosphorus drops rapidly in periods of drought and calcium increases to a point that is unfavorable for the best nutritional balance).

These analyses would indicate that a good farmer could not afford to be without plenty of good pasture. When one acre of good pasture will carry a cow, why waste the cow's time and energy making her get her living from poor forage on six acres of land?

All of this about permanent blue-grass-clover pastures is very well, but what about the periods of drouth when pastures are short and the cows have to be barn-fed? Most farmers have an aversion to pasturing cropland and second-growth clover because they say, "It makes the ground hard." Sudan grass as emergency pasture has a high carrying capacity but it may be dangerous in periods of drouth or frost. Most emergency pasture crops are expensive and, in addition, they tend to leave the soil exposed to erosion when it is most likely to wash. What then can we offer to supplement the permanent pastures during drouth periods?

The triple-purpose mixture for hay, grass silage, or rotation pasture is suggested. This mixture was revised a few years ago when Ladino clover began to astound us with its high yields, its persistence, the high feed value of the forage, and the way livestock sought it. As soon as we were sure that it would do the job in Pennsylvania, demonstrations of rotation pastures were established using the triple-purpose mixture.

The question arose, "Where should we put it?" The answer came immediately, "In one of those small fields near the barn where most of the manure has been dumped for years—the richest soil on the farm—where the best corn grows and where the oats always lodge." The grasses and legumes in the triple-purpose mixture respond to high fertility and on good soil will really produce.

The triple-purpose mixture is made up as follows:

	Lbs. Per Acre
Timothy (can be seeded in fall with winter grain)	8
Orchard grass	5
Meadow fescue (or Tall fescue)	5
Alfalfa	5
Red clover	3
Ladino clover	1
Total	22

Perennial or Domestic ryegrass, 5 pounds, is added if the mixture is seeded without a small grain nurse crop or if the oats are to be grazed off. If small grain is used, we always say, "Sow it thin —not over one bushel to the acre," and often the grain yields are about as high as ever, and the stand of grass is much better.

The mixture is seeded just like any other grass mixture in the early spring (or in late summer without a nurse crop of small grain on a well-prepared firm seed bed with a good shot of complete fertilizer (400 pounds of 4-16-4 is the favorite seeding application). That fall it is manured with reinforced manure (extra phosphate).

Why use orchard grass? It gets bunchy and the cows won't eat it! The answer is that it is not going to stay in sod long enough to get bunchy, and that it is there to produce a maximum feed during dry weather. And it does just that!

Why include meadow fescue? Because it, too, is drouth-tolerant and produces good quality forage in generous amounts. Tall fescue is an improved form of meadow fescue.

Is one pound of Ladino clover enough? Yes. Many farmers have used more but now consider more than one pound to the acre unnecessary in this mixture. In the second year it is nearly solid Ladino anyhow.

Now that we've got it, what will we do with it? Take the first cutting for silage when the first heads of orchard grass break the boot. You don't have a silo? Then add a little more timothy, and cut it early for high-quality hay when the orchard grass begins to head out. We're assuming that the permanent pasture is in its prime and you don't need the extra pasture.

If there is not enough bluegrass pasture to go around, turn the heavy milkers into this rotation pasture in the spring as soon as the ground will hold them. It will take five or six good cows or more to keep down one acre of it when the growing conditions are right.

With good rainfall through June and July, the bluegrass pasture will be in fine shape and the rotation pasture will be ready to cut again. Take it off for hay. In a week to 10 days it will be ready to graze if needed. In other words, this triple-purpose mixture does just what it is supposed to do. It makes the farm program more elastic, it provides emergency grazing when it is needed, and it makes excellent hay or grass silage when it isn't being pastured.

How much feed will it produce, what is the feeding value, and how long should the stand last?

The average yield of green grass (as cut for the silo) has been close to 25 tons to the acre in four cuttings. In terms of dried grass as hay, the yield has averaged over five tons to the acre. The amounts of protein and minerals produced per acre are much higher than the best bluegrass pastures and more than good alfalfa. First cuttings (made early) run around 20 percent protein. Later in the summer when the Ladino is heavier the protein runs close to 25 per cent. Dry weather hurts it, but not as badly as you would think if the stand is good. The way the Ladino clover hugs the ground with those heavy runners and covers it with big leaves seems to keep the soil moisture from evaporating so fast.

As to carrying capacity for short periods of grazing, we have records of 20 cows getting their fill during three hours of grazing each morning for a period of three weeks. Ten to twelve cows to the acre for periods of two to three weeks is not uncommon. After an intensive grazing period it needs a rest, but then it is ready to go again with 8 to 10 inches of fresh new succulent growth.

Do the cows like it? Farmers report that they leave third-cutting alfalfa to get to it. But have the cows well filled with hay when you turn out to avoid possibility of bloat. No one has reported bloat on triple-purpose mixtures, but there is always the chance.

This rotation pasture normally will stay down in sod for only two to three years. In some cases it is grazed only one year. With good management it will last for many years. The idea is to have three or four small fields of about two acres each close to the barn so that a new one is seeded down each year. As one gets thin it is plowed, cropped to corn, then small grain, and seeded back to the same mixture. Each farmer will no doubt manage according to his needs. My best advice is to keep it in grass as long as it is good.

Summary of Clipping Cage Demonstration Results in Pennsylvania, 1939 to 1941

Type of Demonstration	Year	Tons to the Acre		Protein		P_2O_5		CaO	
		Green	Air-dry	Percentage on dry basis	Approximate yield per acre (lbs.)	Percentage on dry basis	Equivalent to 20% superphosphate (lbs.)	Percentage on dry basis	Equivalent to ground limestone (lbs.)
IMPROVED Kentucky blue-clover permanent pastures. Average for state.	1939	11.8	2.8	21.6	990	...	...	...	...
	1940	13.0	2.7	22.2	1100	.92	248	1.06	115
	1941	13.4	3.0	20.4	1200	.83	250	1.22	150
Representative UNTREATED permanent pastures. Average for state.	1939	1.7	.6	13.5	167	...	...	...	...
	1940	2.7	.7	13.6	190	.59	42	.83	23
	1941	2.2	.6	12.8	150	.55	33	.95	20
All LADINO clover-grass mixtures for hay and pasture. Average for state. (9 cos., 10 dems.)	1941	20.1	4.2	22.7	1750	.82	330	1.90	300

Cleans Garden Tools

A discarded woven steel pot cleaner is the best thing I have ever found to clean soil or rust from a hoe, spade or other garden tool. It is handy to use and leaves a clean, shiny surface. The cleaner is also fine for cleaning dirty eggs, especially when one sells to a dealer in quality eggs, who insists that they be dry cleaned and not washed.—Mrs. O. C.

—*Kansas Farmer*

Watch Out for It!

Condensed from The Horse

Charles Longstreth McNichols

THE object of this article is not to cause any undue alarm, but to give horsemen some necessary information on the subject of dourine in general and its present occurrence in the Southwest in particular. The principal difficulty in combating the spread of this disease lies in the fact that not one horseman in a hundred of the present generation has ever seen an animal infected with dourine and a surprising number have never even heard of it. In some cases, we know animals having dourine in its primary stage have been allowed to breed and spread the infection because the owners thought them sound.

Dourine is called variously, "horse syphilis," "breeding paralysis" and "chancrous epizootic." As near as I can find out it has never been known in the eastern states. It was first discovered in Illinois in the early '80s, introduced there by an Arab stallion imported from France. The resultant epidemic is still sometime referred to as the "great epizootic" by old-time horsemen. No one knew what it was or what to do about it, and it spread west quite rapidly. Finally quarantine measures were adopted and it was apparently eradicated in 1888, only to re-appear sporadically in the range country in the Northwest until 1912, when it was stamped out in all areas except for endemic occurrences among "wild" horses running on an isolated and almost uninhabited district in the extreme northwest corner of Nevada and southeast corner of Oregon.

Just about a year ago dourine was discovered to be fairly well established in southern Arizona. Then in February of this year a veterinarian in private practice found an infected Palomino stallion on a ranch near Chula Vista in San Diego county, California. Dr. Duckworth of the California Bureau of Animal Industry immediately sent a testing crew into the area.

To date reports have been received from the federal laboratory on twenty-four hundred complement-fixation tests taken on San Diego horses. Of these, fourteen returned positive—two stallions, eight mares, and please note, four geldings. The stallions

Reprinted by permission from The Horse, 810 18th St., N.W., Washington, D. C., July-August, 1941

were both Palominos in color, one of them a Mexican import. One of the mares was a Palomino, the rest were nondescripts of the range horse type.

In addition to these, a carload of twenty-six mustangs from Sonora, Mexico, all consigned for immediate slaughter to a dog-food factory in Southern California, was bled and one reactor discovered. Another reactor was picked up from a bunch of slaughter horses that were driven in from Sonora to the entry port of Mexicali in Lower California.

In Arizona, Dr. Jones, the state veterinarian, and his staff have received reports on eleven thousand horses from all parts of the state, other than those of the Papago Indian Reservation. Of these forty-six were reactors—but among the five thousand horses tested on the Papago Reservation, near the Mexican border, nearly *four hundred* reactors were found.

Now the Papagos are a binational race, or rather the desert that they have inhabited since time immemorial is divided by the boundary line between the state of Arizona and the Mexican state of Sonora. Naturally, the Papago *rancherias* on both sides have continuous commerce with each other, and horses are a principal feature of this commerce. If such a huge percentage of the horses of the American Papagos have dourine it is reasonable to assume that the same exists among the horses of the Mexican Papagos. Hence, even before the dourine reactor was discovered in the Mexican shipment to California, Mexico was suspected as the source of this present outbreak.

Right now our Federal Bureau of Animal Industry has a man in Mexico City who is in consultation with the officials of the Mexican Department of Agriculture on the dourine situation. In my opinion nothing can be done immediately down there but to make arrangements for strict quarantine on Mexican horses. I believe it will be found that dourine has been endemic among Mexican range horses for a long time. This means that these horses will have built up such a resistance to the disease that many of them will carry the *Trypanosoma equiperdum* in their blood without any visible indication of the disease. These "carriers" can transmit the infection and it may appear in a virulent form in non-immunized contacts.

Eradicating dourine from free-roaming range horses is a rough problem at best. In Arizona Dr. Jones estimates it will take five years to entirely eradicate the infection. Thousands of range horses have to be rounded up, roped, and bled. Four ounces of blood from each individual must

be sent to the laboratory in Washington. When the results are returned, any reactor must be destroyed, for we have no entirely reliable cure for dourine. Later, the whole gigantic task must be done over again, for only when the entire area shows no reactors can it be rated as dourine-free.

In Mexico, the problem would be comparable to that in Arizona, with the difficulties multiplied many times, due to its greater and more diversified area.

On the other hand, the eradication or prevention of dourine in a land of fenced pastures, such as in the Eastern part of the United States, is comparatively easy. Dourine is not contagious in the true sense. It is infectious only and, as far as we know, the infection is only transmitted through sexual intercourse. There have been some observers who maintain that in some cases it might have been transmitted by the bite of an unknown or unspecified insect. A surprising number of infected geldings have been found, but indications are that they contracted the disease by covering infected mares.

In its primary stage, dourine shows up as a swelling, irritation, and ulceration of the genital organs, which may or may not be severe. If all cases were severe the problem of eradication would be simple, because any breeder would know immediately that there was something radically wrong with the animal, even if he'd never heard of dourine, and he'd be a careless man indeed if he did not call in his veterinarian. But too often the primary lesion is only a blister that breaks to form a small ulcer that may heal up in a few days, leaving a characteristic white scar that may easily escape notice if the breeder does not know its significance.

This white scar is small, pit-like, usually from an eighth to a half inch in diameter. It may be puckered around the edge or it may be smoothly cupped like a pockmark. There may be one or several.

Watch out for it! Any animal with such a scar or scars in the genital region should be tested for dourine immediately. For after this primary lesion heals the horse may show no further symptoms of the disease for weeks, months, or even years, and yet be perfectly capable of transmitting the infection.

Some animals have a certain immunity to dourine and never show any further symptoms, but remain dangerous carriers throughout their lives. Usually, after an unpredictable interval, the nervous or constitutional disturbances characteristic of the secondary stage appear. These take the form of paralysis, particularly of the hindquarters,

swelling, and any number of distressing symptoms. These are of only clinical interest. A dourine infected animal is a menace to the whole breeding industry. A blood test should be taken at the first suspicion of occurrence, and if the animal is shown to be a reactor it must be destroyed immediately.

In Arizona dourine reactors have been found in all but two or possibly three counties, perhaps in more by the time this article is in print, for the state-wide testing program is still under way and I understand a scattering of reactors are being picked up all the time.

In California the state legislature has appropriated $42,700 for a program of testing and eradication of dourine. Several crews consisting of a veterinarian and a helper are now working in San Diego county, where the disease was first discovered. After they clean up San Diego county they will move on to Imperial, the only other California county that has a common border with Mexico. From there they will move north and ultimately cover the whole state.

In addition, most of the larger breeders in all parts of California have had their animals bled by private veterinarians, and I am happy to report that no reactors have been reported out of this group.

There has been no dourine found among Thoroughbreds (racing horses) either in California or Arizona. I was informed that no reactors have been found among horses of any registered breed, but I have since received information from Washington that some registered horses, other than Thoroughbreds, have been reported, but what breed was not stated.

However, almost all the reactors found to date either in California or Arizona are light saddle horses of the stock-type, and the vast majority are either range-bred or have had contact with range horses. The greatest percentage of dourine cases is always among horses that are Mexican imports or Mexican contacts.

All horses shipped in from Mexico should be suspected. True, most of those being imported are dog-feed animals consigned for immediate slaughter, but there is a supposition in some quarters that some animals have been shipped under that category that in the past did not wind up in dog-food cans.

Another possible means by which the infection might have been spread to other sections of the country is by horse-trailers. Train shipments can be easily checked and controlled but horse-trailers flit hither and yon over the highway like birds of passage. We know of one case where

a range stallion, a known dourine contact, was transported from Arizona to Texas and thence to California. This animal was tracked down, bled, and fortunately found to be negative—for it is one of the characteristics of the disease that some contacts never do become infected.

There are numerous unconfirmed stories that horses from the dourine area in southern Arizona were hastily transported eastward by trailers as soon as the story broke that the disease had been discovered. There may be nothing to this, and if there is these animals may not be infected. But as the Dutch farmer told the careless motorist, "It never hurt nobody, no time, to watch a little out."

Remember, the only sure way to determine whether or not a horse is a dourine carrier is by the blood test. If you are in or adjacent to a dourine area, the safest thing to do is to call in your veterinarian and have your animal bled. Another excellent practice is to have all animals tested at time of purchase, particularly if there is any remote possibility that they may have had contact with horses from a suspected dourine area.

Another thing, do not imply that because dourine has not been found among Thoroughbreds to date, that Thoroughbreds can not contact the disease. The *trypanosoma* does not respect pedigrees. A ten thousand dollar Thoroughbred stallion is even more likely to be infected by a diseased mare than a ten dollar mustang because he is much less likely to have acquired any degree of immunity to dourine.

Electric Bull Prod

An electric prod is a great gadget for handling bulls. A big bruiser too tough for a lash or a club steps right along on command after a few shocks. Peterson Brothers use one to rush beef bulls through chutes that lead to their dipping vat in Garden county, Nebraska. Dairymen use them to push bulls from the breeding stall back to pens. Some of the prods are constructed much like an overlength flashlight, and small dry cells are used to supply the current, which is discharged only when the prod makes contact with the bull's hide. —*Cappers Farmer*

"Rabbit Box" Calf Pens

Condensed from The Ohio Farmer

Elden R. Groves

TEN cows or fifty, rare is the herd that goes through the years with no trouble in the calf pens. Nobody has ever attempted to figure the annual loss to the industry, but it's an important management problem.

Several farms have been working on that problem with an idea that seems to have real promise. This is an individual calf pen, with a raised floor providing drainage for liquid manure. It practically licks the scours problem. Whether the good results come from the clean, dry bed entirely, or whether it is the fact that spread of disease organisms is minimized by individual pens, is hard to say.

The New Jersey Experiment Station was one of the pioneers in off-the-floor pens, and publication of their results spread the idea over the nation. Beginning in 1936, several types of flooring were tested. H. H. Tucker, then associate professor at the institution, reports that bedding saved by this method was almost 50 per cent, and that would repay the cost of the flooring in less than a year. It is a labor saver, too, because the pens have to be bedded only every week or 10 days while the calves are small.

The first floors at New Jersey were of ¾-inch mesh wire stretched over No. 9 woven wire fencing, on a wood frame. A steel company became interested, and after testing several ideas, a floor known as "expanded sheet metal" was put on the market. This stuff is similar to metal lath, but is heavier. The flooring is made in flat section on metal frames, or it is offered in sections with a surface 1 x 4 feet, with ends and sides turned down four inches to support it. With these sections, pens of any size can be built.

The floors in the pens at Ohio State University are of wood—six-inch boards spaced with cracks a half to three-quarters inch wide. These are off the floor about four inches. The sides of these pens are solid. In building these, Professor S. M. Salisbury and Herdsman Roger Denney felt they were killing two birds with one stone. The solid walls would prevent the calf nosing other calves or cattle which might

Reprinted by permission from The Ohio Farmer, 1013 Rockwell Ave., Cleveland, Ohio, March 7, 1942

carry germs of diarrhea, and in addition they would help keep the temperature even.

The results? Wonderful. Almost no digestive troubles, no pneumonia, no calves off feed, Professor Salisbury reports.

The university pens are 4 x 5 feet, with a little hay rack and feed box in one end taking up one foot, which means an actual 4 x 4 feet in floor space. The sides are three feet high, which Denney says is not quite enough. A frisky calf jumps out once in a while. The pens are built two and three to a unit, with two pens quite a little larger than the others, for larger calves.

Breezy Hill Farm, well-known Jersey establishment in Hamilton County, built some pens a couple of years ago, and they are different still from the first two described here. Manager Paul Jackson decided that in addition to protecting the babies from infection from other cattle, he would build the pens so high that no man could step inside, and thus protect them from infection carried on shoes. His pens are three feet off the floor, and even though he gets kidded about his "rabbit boxes," he still likes them. He reports, too, that calves start out in these pens with never a sick day. He doesn't use them in hot summer months. He says most of the calf troubles come in winter and early spring.

Here is the list of supplies needed for a pen like the one used at Breezy Hill Farm:

4 pieces 2" x 4" x 6'
4 pieces 1" x 3" x 3'
6 pieces 1" x 4" x 4'
4 pieces 1" x 2" x 4'
2 pieces 1" x 2" x 5'
3 fiberboard panels 3' x 4'
1 fiberboard panel 1' x 3'
Hardware cloth, 4' x 7'

The frame of the floor consists of 1 inch by 4 inch boards nailed to the four posts, and then there are two extra cross boards to keep the hardware cloth from sagging.

The raised floor, for the purpose of keeping the bedding dry, can be used in a large pen without sides. There is really only one caution — bedding sifts down through any open floor, so be sure to build it in such a way that the space under the floor can be cleaned.

New Facts on Cannibalism

Condensed from Canadian Poultry Review

Gordon E. Bearse

Poultryman, Western Washington Experimental Station

FROM time to time we have reported our experiments to find out more concerning the causes of cannibalism. Several trials showed that ground oats rations, oat hull rations and oat mill feed rations were effective in preventing the development of cannibalistic habits. Corn, wheat and barley rations as well as rations containing the oat minerals always resulted in considerable feather picking and cannibalism mortality in confined birds.

Imagine our surprise then, when in the summer of 1939 in the continuation of this work cannibalism developed almost as early in the season and nearly as severely in the pens receiving oat fiber as in those where corn was the only grain. In this particular experiment we were trying to find out whether the fiber in alfalfa stem meal, wood flour and charcoal as well as the bulk of beet pulp would do the job as well as oat fiber or whether this property was peculiar to the latter. The results were nearly the same for all the pens. They all developed the vicious habit, even those fed the ration that had prevented it so many times in the past.

Was there an explanation of this upset? Every poultryman knows that crowding brings on cannibalism. Large broods of 500 or more chicks frequently develop the trouble, particularly if they are not given lots of floor space. It is customary to allow one-half square foot of floor space per chick and increase this to one foot at eight weeks, two feet at twelve weeks and three feet in sixteen weeks when pullets are being raised in confinement. Surely this was not the explanation for we only started 70 pullet chicks in each pen and the size of a pen in our nutrition experiment house is 10 x 20 feet. Furthermore, one of the previous experiments had been run in this house with similar size groups.

Inadequate eating and drinking space is another recognized cause of cannibalism, but we had seen to it that the chicks were provided at the start with eating space at the rate of eight feet per 100 and drinking space at the

Reprinted by permission from Canadian Poultry Review, Toronto, Can., Oct., 1941

rate of two feet per 100, as recommended. This space was increased gradually, as the chicks grew, to double the amount by the end of the eighth week and to three times the amount by the time the pullets were three months old.

A warm stuffy brooder house many times causes outbreaks of toe picking and tail picking, but we were using electric brooders in a cool, well ventilated building. There were no skylights to warm the pens up in the middle of the day or make sunspots on the floor for the chicks to congregrate in. The natural tendency to preen feathers and pick at the pink quills often leads to trouble starting when chicks are sunning themselves. In fact, this house even had a ceiling which would tend to make it cooler.

Naturally there was more idleness among the chicks than most poultrymen would believe desirable because it was impossible to feed scratch grain or green feed in a feeding experiment such as this. However, this was no different from the feeding practice in previous experiments in which no cannibalism developed on rations of about eleven per cent fibre derived chiefly from oat hulls.

The explanation did not seem to lie in any of these things so we began checking back on possible differences in the method of conducting the experiment this year as compared with other years. Two changes in technique had been made, both of which were designed to eliminate variations in results. The first of these was making pellets of the rations instead of feeding them as all-mash. This change was decided upon because it tended to prevent the birds from picking over the feed and it eliminated individual bird preference for certain ingredients. The other change was the use of sand litter instead of straw litter. This seemed necessary in an experiment designed to study the effects of different kinds of fiber because wheat straw always contains some chaff.

Was it possible that one or both of these changes included to improve the technique of the experiment was responsible for the startling results? The only way to prove or disprove this idea was to set up an experiment designed to compare all-mash and pellet feeding of the same ration on straw and sand litter. This was done in 1940.

Three levels of fiber were fed in last year's experiment and each level was fed to two pens in the all-mash form and two pens in the pellet form. They were compared with the high corn ration in the all-mash form. These were all fed to birds on sand litter and then in addition four more pens were included on the middle fiber level, two of which were on

straw litter and received it in the all-mash form, and two on straw litter received it as pellets.

It became apparent at an early age that pellets definitely had an effect on cannibalism in confined birds. This is shown in Table 1 where it may be noted that when the chicks were observed at six weeks of age three per cent of them were feather picked on the eight per cent fiber level and twelve per cent on the thirteen per cent level, while no chicks receiving the ration in the all-mash form were picked.

Four weeks later the only all-mash birds showing any amount of picking were those receiving the eighty per cent corn ration which in previous experiments had always produced feather picking and often at an early age. The pellet pens by this time were becoming severely cannibalistic with the exception of those on the highest level of fiber. However, a few weeks later these lots were also picking.

Feather picking increased as the summer progressed on the eight per cent fiber all-mash pens,

Table 1 — Cannibalism Observations on Pullets Fed Different Levels of Fiber in Both Pellet and All-Mash Forms

Ration fed	80% Corn	8% Fiber		13% Fiber		18% Fiber	
Form of ration	All-mash	All-mash	Pellets	All-mash	Pellets	All-mash	Pellets
Per cent feather picked at 6 weeks of age	0	0	3	0	12	0	0
Per cent feather picked at 10 weeks of age	20	0	70	1	54	0	0
Per cent feather picked at 18 weeks of age	73	29	100	4	98	2	16
Per cent feather picked at 32 weeks of age	100	41	100	7	100	0	69
Feather picking score at 32 weeks of age	4.7	.6	7.3	.1	3.8	0	1.3
Per cent cannibalism mortality to 32 wks. of age	10	7	35	2	10	0	3

Table 2 — Cannibalism Observations of Pullets Raised in Straw and Sand Litter

Ration fed	13 per cent fiber			
Form of ration	All mash		Pellets	
Kind of litter	Straw	Sand	Straw	Sand
Per cent feather picked at 6 weeks of age	0	0	0	12
Per cent feather picked at 10 weeks of age	0	1	0	54
Per cent feather picked at 18 weeks of age	2	4	46	98
Per cent feather picked at 32 weeks of age	5	7	92	100
Feather picking score at 32 weeks of age	.1	.1	1.6	3.8
% cannibalism mortality to 32 weeks of age	.8	1.5	12.0	10.0

but at thirty-two weeks of age averaged only 41 per cent against 100 per cent birds picked in the pellet pens on that ration. Picking continued to be of minor importance in the other all-mash pens.

The feather picking score is a good indicator of the severity of picking because each bird is scored for the degree of feather picking on its neck, back, tail, under-tail, abdomen and leg areas, and the total of these values is its feather picking score.

Table 1 shows the feather picking score to be less than one at thirty-two weeks of age for the all-mash pens with the exception of the high corn pens which were 4.7. The pelleted pens' scores ranged from a high of 7.3 for the eight per cent fiber to 1.3 for the eighteen per cent fiber.

Cannibalism mortality is much higher in the pellet fed pens and decreases as the percentage of fiber in the ration increases.

The information in this table certainly indicates that the feeding of rations in the pelleted form to birds in confinement is conducive to the development of cannibalistic habits. It also shows that increasing the fiber in a ration tends to reduce cannibalism on both pelleted and all-mash rations, although more effectively on the latter. Unquestionably, these results explain the difficulties encountered in the former experiment where all the rations were pelleted. But why should this be the case and what explanation is there for it? Does pelleting destroy some factor in the feed? We think not. We believe that the explanation lies in the fact that pelleted feeds can be eaten easily, large quantities can be taken in quickly, thus allowing the birds greater amounts of idle time for the development of cannibalistic habits. All-mash rations are not nearly as easily eaten and therefore the birds spend considerably more time at the hoppers. This explanation is borne out by observations of the time spent in eating in the various pens and also by the decreased cannibalism as the fiber level was increased, thereby increasing feed consumption and of necessity eating time.

You will note that the pelleted pens on sand litter developed cannibalism first and even at thirty-two weeks of age the straw lots were still lower in per cent birds picked. Their picking score at this age was only half that of the sand pens. This may have been the result of eating chaff but we believe it can be explained by the increased activity of the birds, as the litter was changed three times weekly to control coccidiosis. There was little difference between the lots of all-mash fed birds whether they were on straw or sand.

We wanted to continue our cannibalism experiments after we found that oats were helpful in preventing outbreaks. We know now that increased feed consumption and therefore time spent in eating was at least part of the answer and that ground oats should be more effective than whole oats. Perhaps it explains, too, why research work must be slowly and carefully carried out and why checks and controls are so important. Efforts to speed up the work by making two changes in experimental methods at one time and by economizing in the number of pens to make some available for other work resulted in the full significance of the 1939 experiment being hidden until 1940 work had been completed.

Self-feeding of Fattening Lambs

Condensed from The Farmer

FIVE years ago the first experiment in the self-feeding of fattening lambs was held at the West Central School of Agriculture at Morris, Minnesota. At that time they couldn't have known how important self-feeding would become as a labor saver in this war year of 1942. The fifth in this series of experiments was recently completed and reported upon at the annual Lamb Feeders' Day held at the Morris Station on January 28.

Self-feeding of fattening lambs has always been considered a ticklish proposition, because lambs are so easily put off feed, and many of the leading feeders today are afraid to tackle it. They need fear no longer if they pay close heed to what has been done at Morris under the careful and capable direction of Phil Jordan, animal husbandman at that station. It's all a matter, it seems, of diluting the main fattening ingredient, corn, so that the lambs can't get an overdose of it. The corn is mixed with roughage so that the lambs have to take both. That sounds simple enough, but there is a trick to it nevertheless.

The particular questions that the Morris feeders tried to answer in the experiment just finished were these:

1. What proportion of chopped alfalfa hay is most desirable to use in diluting corn for self-feeding?

2. Is it necessary or desirable to feed hay in addition when chopped hay is mixed into the grain ration?

3. Are oats satisfactory to use in diluting corn for self-feeding and how do they compare from the standpoint of cost and efficiency with chopped alfalfa hay?

Six lots of 30 lambs each were used in the experiments. The No. I lot for checking purposes was hand-fed in the usual fashion on shelled corn and unchopped alfalfa hay. Lots II, III, IV and V may be passed over for the time being. Lot VI was self-fed on ground corn 60% and chopped alfalfa 40%. Lot VI made the largest margin per lamb over feed cost, and the greatest daily gain of the entire six lots, and these two items are among the principal measuring sticks of comparative efficiency.

All of the other lots, except Lot I, were self-fed on a variety of rations consisting of shelled corn 70% and whole oats 30% with unchopped alfalfa hay;

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ground corn 80%, chopped alfalfa hay 20% and whole hay at will; ground corn 70%, chopped alfalfa 30% and unchopped alfalfa at will; ground corn 60%, chopped alfalfa 40% and unchopped alfalfa at will. But remember that Lot VI, which was the banner lot, received nothing but ground corn 60% and chopped alfalfa 40%. The lot fed whole oats as a dilutent of shelled corn made the poorest showing of all, but nevertheless the use of oats for this purpose was satisfactory because none of the lambs in this lot showed any particular digestive disturbances.

As officially stated, the conclusions to be drawn from these five self-feeding experiments, are as follows:

1. Corn can be satisfactorily self-fed when diluted with as much as 20% or more of cut or chopped alfalfa hay or with 25% or more of oats.

2. Mixing 40% of chopped alfalfa hay with ground corn has proved more satisfactory than any amount, either above or below this figure.

3. When the chopped alfalfa hay is mixed with ground corn to the extent of 40% and self-fed, no additional hay need be fed.

4. Self-feeding a mixture of ground corn 60% and cut alfalfa 40% proved a highly satisfactory method of feeding fattening lambs.

In the present and other experiments with self-feeding of lambs, hand-feeding is always used until the lambs are on full feed. In the most recent experiment hand-feeding was carried on for 35 days.

As usual, there was a capacity crowd at the program. The lambs in the experiment were there for inspection of visitors. The feeding trial was explained by Phil Jordan.

Alfalfa

Five years' results from four seedings of Grimm and common alfalfa at rates ranging from two and one-half to 50 pounds of seed per acre have shown at the Ohio Agricultural Experiment Station, Wooster, that there is no significant increase in yield of hay per acre for rates of seeding above seven and one-half pounds per acre.

The average standard rate of seeding alfalfa in Ohio is 10 to 12 pounds per acre. But C. J. Willard, agronomist at the station, states that seven pounds is sufficient under the best seeding conditions. He has observed that if conditions are so poor that 15 pounds per acre will not give a satisfactory stand, something other than the rate of seeding needs correction.

—*Successful Farming*

Fertilizing for More and Better Vegetables

Condensed from Better Crops With Plant Food

H. D. Brown
College of Agriculture, Columbus, Ohio

IN spite of assurances that our fertilizer supply will be adequate for all needs, the present emergency calls for a re-examination of these needs in the light of new demands, new emergencies, and old emergencies only recently recognized.

The present demand arises from the knowledge that these vegetables are essential for proper nutrition. They are the protective foods essential for health. But all vegetables are not equally healthful. Some varieties of carrots, for example, contain more Vitamin A than others. Fertilizer treatments alter the mineral and vitamin content of many vegetables. Minerals such as calcium, phosphorus, magnesium, iron, and many others are necessary for animals as well as plants. The present demand is for vegetables grown and fertilized so that they provide a maximum of vitamins and minerals for health.

There are at least two different procedures in fertilizing vegetables. In general these methods can be designated as (1) intensive and (2) extensive.

Intensive gardeners apply large amounts of commercial fertilizers and organic matter. Soils cultivated by this group, which includes market gardeners and our most successful potato growers, receive annual applications of from 750 to 2,500 pounds of a complete fertilizer per acre. Market gardeners commonly apply in addition approximately 15 tons of manure per acre annually. Of course applications vary widely in different sections, but a surprisingly effective treatment for these intensively cultivated soils consists of 1,000-1,500 pounds of a complete fertilizer per acre plus 15 tons of manure. Soluble nitrogenous fertilizers are used as side-dressings when needed, and they are commonly needed for leafy vegetables. Potato growers generally secure the organic matter supply by plowing under green manure crops primarily because it is cheaper than manure and also because manure encourages scab in some instances. The potato growers make a little more effective use of the commercial fertilizer by applying practically all of it in bands along the sides of the rows.

Vegetables grown on these highly fertile soils are generally

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of the highest quality. The necessary minerals are present, and the gardeners who are intelligent enough to provide proper food also provide adequate moisture and meet other requirements.

Their soils are now more fertile than they were 100 or more years ago. These soils, perhaps less than 2,000,000 acres in all, represent the notable exception to the outrageous depletion of our natural resources of soil fertility in the United States. On these soils it is not so important to wrangle over fertilizer analyses. Enough is applied for the needs of all crops and the omission of an application for an entire year, although not advisable, would probably not greatly reduce the yield.

The other type of vegetable gardening—the extensive type—makes use of poorer soils where more exacting fertilizer practices must be followed for success and where, unfortunately, vegetable production is only a side line and the farmer finds it difficult to master the details essential for success. This is the type of gardening that will probably net the greatest increase in acreage during the present emergency, for canning tomatoes and peas are commonly grown by this type of culture and they represent two vegetables in great demand by our and allied armies.

A few rules may be helpful in arriving at a useful fertilizer program.

(1) Acid silt loam soils usually need additional phosphorus for vegetables.

(2) Sandy soils usually need both nitrogen and potash applications before they will produce profitable crops of vegetables.

(3) Muck soils and dark soils usually contain inadequate amounts of potash for successful vegetable culture.

(4) Leafy vegetables, especially spinach, require large and constantly available supplies of nitrogen.

(5) Root crops require especially adequate supplies of potash.

(6) Fruitful crops, tomatoes for example, generally require a liberal amount of phosphorus.

(7) Fertilizer applied in bands at the sides of rows and slightly deeper than the seed is generally more effective in increasing yields than the same amount broadcast.

(8) Most vegetables tolerate and many thrive best in a soil acidity adjusted to lie between pH 6 and pH 7.

Quick soil tests and the ability to recognize the hunger signs of vegetables are useful supplements to the foregoing rules. Quick soil tests for acidity, phosphorus, potash, and in some instances other elements are made free of charge by the extension workers in some states. They are a valu-

able supplement, but should not be depended upon exclusively.

More reliable indices can be secured by noting the type of growth made by the plants. Chemical tests of these plants often confirm conclusions drawn from observations. To be most useful, these observations must be continued from year to year and future fertilizer applications based upon past observations. Yield data are useful in the same way. Applications of soluble nitrogenus fertilizers made during the growing season are effective for nitrogen hunger if washed down to the roots by rainfall or irrigation water. In general phosphates and potash applications must be made at a depth of 2 to 4 inches before the roots of the plants have made much growth because these fertilizing materials, with a few exceptions, do not move about in the soil.

The hunger symptoms of vegetables have been described and illustrated in many publications. Every vegetable grower should have access to some such publication. The successful grower must be able to recognize deficiency symptoms.

Nitrogen hunger is characterized by stunted plants that have light green to yellowish leaves on the older portions. The entire surface of the leaves becomes yellow without the presence of dead spots as is the case if the yellowing is caused by insect or disease attacks.

Nitrogen hunger is most prevalent on sandy soils and on older plants. It can be corrected in a few days time with surface applications of 100 to 200 pounds of sulphate of ammonia if water is applied so that the nitrogen reaches the roots.

Phosphorus hunger causes the plant to become stunted and the foliage to become dark green to purplish in color. The dark green color of phosphorus-starved plants is often deceptive, since growers generally consider a dark green color to be essential for health. A light green colored tomato plant, for instance, often is capable of yielding twice as much as its dark green colored neighbor. As already indicated, phosphorus hunger must be anticipated and corrective measures taken prior to planting.

Potash hunger is often confused with conditions brought about by fungous diseases, since it results in the speckling of the foliage and the death of the margins of the leaves. It also produces poorly colored and lopsided tomato fruits and cucumbers with constricted stem ends. Fertilizer applications for potash hunger also must be made prior to planting the crop.

With these generalizations in mind, we are now ready for some specific recommendations for fer-

tilizer analyses. First we should correct the pH to 6-7 by the addition of lime, except for potatoes, when it should be 5.0 to 5.2 if scab is prevalent. Muck soils require more calcium carbonate to effect pH changes than silt loam and sandy soils.

For silt loam soils a formula high in phosphorus, such as a 2-12-6 or 4-16-4 is essential. The exact ratio should be modified if quick soil tests, hunger signs, or other data indicate a greater need for any fertilizer nutrient.

For sandy soils a 4-10-6, 4-8-8, or 6-8-6 may be advisable. Note that larger amounts of nitrogen are used. In addition to this, such soils frequently require surface applications of soluble nitrogenous fertilizers during the growing season. Large amounts applied before the crop is planted are likely to be leached away. Sulphate of ammonia plowed under to a depth of 4 to 5 inches is not leached away nearly so rapidly as it is when applied as surface dressings.

For black soils and muck, an 0-8-24, 3-9-18, or 0-12-12 fertilizer is generally recommended. Here potash is generally the limiting element and applications should be made at a depth of 3 to 4 inches at or prior to the time the crop is planted.

The amount to apply varies with the method employed. The most effective results are obtained by applications placed in bands several inches away from both sides of the rows and slightly deeper than the seed, about three inches deep. For sweet corn and beans planted in rows 3 feet apart applications of 125 to 150 pounds per acre produce excellent results. Of course such applications do not add much to the fertility of the soil. Broadcast applications of 500 pounds or more are generally required to effect equally good increases in yield.

If the rows are 18 rather than 36 inches apart, the same rate applied as band applications would require 250 to 300 pounds per acre; and in rows 12 inches apart, as for onions, it would require 375 to 450 pounds per acre. Except for potatoes, where the fertilizer is applied well to the sides of the rows, it is not considered good practice to apply more than 1,000 pounds even if the rows are only 12 inches apart. If greater amounts are used for the production of bumper crops, some of the fertilizer is broadcast.

Surface applications of soluble nitrogenous fertilizers should be made during the growing season as needed. The need for these nitrogenous applications becomes greater as the amount of the phosphorus and potash applications is increased.

New Factors in Feeding

Condensed from Breeder's Gazette

Samuel R. Guard

WE are standing at the gateway to vast new practical developments in the feeding of our livestock. The biochemists have new forces at their command for quickening an animal's growing, fattening, milking or egg-laying capacities. They have carotene, thiamin, riboflavin, tocopherol, hormones, chlorophyll, sunshine. These things the scientists do not claim to know all about; but that does not stop them from learning how to work with these agents of life just as Edison learned how to work with electricity without ever seeing it.

Some of the most important work in the field of technology is accomplished in the research laboratories of the great industrial concerns. In the same way vital discoveries and applications of nutritional knowledge are most likely to be made on the research farms which some feed manufacturers are setting up to guide them in mixing and merchandising. Indeed, the commercial research laboratory is becoming just as important to Agriculture as it is to Industry.

Some farms are a joy to see because of the lay of the land, the trees and brooks, and the view you get from the stable door. Some farms interest you because of what they produce for their owners. And some farms, a few, are important for what they are doing to forward our whole national agricultural scheme. Such an one is the research feeding farm, near Peoria, Illinois.

Last spring a Hampshire sow on that Wayne Research Farm had 13 pigs. At weaning time the litter was divided into two pens, 6 in one and 7 in the other. All of these pigs got the same feed, same amounts, same analysis, fed in the same way under exactly the same conditions. They were fed corn and supplement, free choice. In their feed was the same amount of protein, same amount of fiber, same amount of fat.

When Dr. J. E. Hunter, director of research for Allied Mills, drove out these shotes for me to see, they had been on feed for 5 months after weaning. They were 7 months old and firmly finished. Yet one lot was noticeably heavier and smoother than the other. Lot 1 averaged 234.7 lbs. Lot 2 averaged 265 lbs. A difference of 34.3 lbs. a pig. Why? The group

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that gained the most ate 342 lbs. of corn and 46 lbs. of supplement feed per 100 lbs. of gain. The other group required 356 lbs. of corn and 50 lbs. of supplement feed to make 100 lbs. of gain. The faster gaining hogs ate less feed per 100 lbs. gain, but made a profit of $20.64 apiece; the others $17.17, a difference of $3.47 a pig which must be charged up, or rather credited up, to something.

Same breeding, you say? Yes. Same age? Yes, the same litter. Same feeder? Same hog house? Same feed formula? Exactly. Well, where did that extra 34 pounds come from?

Eliminating all the other factors, one must conclude that that extra gain was due to the quality of the protein and other ingredients in that supplement. For instance, you can have two feeds, both analyzing 24% protein. But the first feed will contain only 46,000 units of Vitamin A per lb., while the second feed will have 200,000 units of Vitamin A per lb. The second feed will be high in Vitamin K, whereas the first is low in this hemorrhage-preventing factor. The second feed will have almost twice as much riboflavin, which promotes growth and nerve health.

Take dehydrated alfalfa meal. To your naked eye two samples will look the same. Yet one will test out 196,000 Vitamin A units per lb., the other 105,000 units.

Take dried skimmilk, 33% protein. One sample will test out twice as much Vitamin G—riboflavin—as the other.

Or animal liver meal, 65% protein. Handled one way and put in a sack, it will test out 70 micrograms of riboflavin per gram, whereas the liver meal if heated too much or ill-handled will test out only 27 micrograms of riboflavin.

I saw a group of dairy cows on this farm, all on test. Dr. Hunter and his assistant, Dr. Rudy, were comparing a blended source of proteins in a supplement with a single source of protein. Here the dairymen were taking a leaf out of the hogmen's book. Pork producers long since have found that mixed proteins from a variety of sources are more efficient than a single source of protein from only one ingredient. For instance, the Purdue mixture "C" brings in protein from five sources—meat and bone scraps, fish, soybeans, cottonseed and flaxseed. This supplements corn more effectively than if the protein were all obtained from one source, tankage. Evidently there is a more complete set-up of the amino acids—the building blocks of the fleshy house.

At Peoria I saw calves on test to find out just how little of the now-too-precious cow's milk was necessary to take a heifer up to

weaning time. These calves began to get calf meal as soon as they were born. They are taken off milk entirely at four weeks. They were weaned with as little as 75 lbs. of milk, total. What a saving in raising calves!

In the battery feeding rooms, I saw groups of chickens on test. They were getting the same analysis of rations, but the quality of the ingredients was different. It seems that there are a dozen and a half different kinds of commercial meat scraps, very different in quality of protein. For instance, here is a battery of chickens with hardly any feathers. Next to them was a group in good feather. Difference: the quality of the protein and vitamins.

In the laying house were groups of laying hens side by side. Group A got a mash in which every ingredient was tested for quality. Group B got a feed bought on the open market, same formula, but untested. In eight months time Group A hens averaged 60% egg production, Group B hens only 36%. There were 100 birds to a pen here, and the A group laid 486 dozen more eggs in eight months.

In another test were eight lots of chickens on contaminated ground. Hunter and Rudy were evidently hoping to get a quality of ration that would build up disease resistance. Hard by were beautiful Barred Rock pullets working out the answer as to how much feed should bring them to the laying house.

At this research farm they have also a fox and mink ranch, an extensive kennel for dog feeding, and a turkey range running up into the woods. In the turkey range were six pens testing the efficiency of growing mashes. Again it was a test of quality ingredients. Purebred Mammoth Bronze hens are being crossed here with the new Broad-Breasted toms. A growing mash, a turkey concentrate and a turkey supplement were being tested out.

I asked about the beef cattle work. It is being developed at Timberline Stock Farm, Congerville, Ill.

The (Wayne) Research Farm, operated by Allied Mills, consists of 65 acres. Four and a half years ago it was a sassafras wilderness. Today it is a great feeding laboratory of marked concern to the animal industry of the country. Every Tuesday is visiting day and thousands of farmers come here each year. Fourteen hired men work on this farm.

But most important of all is the research laboratory itself. It is a chemical laboratory, or rather a biochemical laboratory. It is presided over by Dr. Hunter.

Some things I saw at Peoria left me wondering if the day is

not coming when we can substitute test tubes for feed-lots. Dr. Hunter can test the quality of an alfalfa meal in half a day by straight chemistry, whereas it would take three months to do the same thing in the feedlot.

Here is the bacterial method for testing the vitamin content of a protein. Certain bacteria require riboflavin as a factor in their growth. If there is more riboflavin, they grow faster; if less ribo-flavin, not so fast. Take *Lactobaccilus casei.* From its name you'd know that's some kind of a buttermilk bacillus. Now here are five test tubes, filled with nutrient solutions, on which the bacteria feed. We introduce measured numbers of bacteria. They produce lactic acid. We can measure that lactic acid. In this way we can measure the amount, and effectiveness, of the riboflavin. As the bacteria increase the solution grows more turbid or cloudy. Then the scientists have rigged up an electric eye which measures turbidity accurately. In other words, you can put these five test tubes in front of the electric eye and measure the turbidity. The turbidity depends on the number of bacteria in there, and those bacteria multiply in direct relation to the amount of riboflavin.

I saw 72 test tubes in a rack. Liver meal was being tested for quality, or amount of riboflavin, by this turbidity plan.

"Seventy-two pens of cattle!" I exclaimed. "Exactly," replied Dr. Hunter. "We get the same measure of growth or fattening power of a feed in one of these test tubes that you get in a pen of experimental cattle. In these test tubes we can test out a great many carloads of feed ingredients."

Or take Vitamin D. We feed it to our children in cod liver oil so they'll grow strong bones, sound teeth. Feed manufacturers use sardine oil, checked for Vitamin D; usually it's fresher. But how are they going to tell the number of units of D in the oil? One way is to feed it to chickens or rats, and compare their bones to the bones of other groups fed oil whose vitamin potency was established by the U. S. Pharmacopoeia. The laboratory assistants take out the tibia, or the drumstick bone, at 3 weeks of age, and analyze it for mineral matter. The deposition of mineral matter is an index to the potency of the Vitamin D in an oil. I saw animals with bones you could tie in a knot; they had been kept out of the sunshine. Sunlight makes Vitamin D. The same vitamin must be there to give strong egg shells. But here they are, killing 3-week-old chicks all the time to see how much mineral matter is in the drumsticks, thus checking the efficiency of Vitamin D.

Take Vitamin G. In poultry, your birds will not grow or reproduce without Vitamin G. It causes the fluorescence in the white of an egg, the greenish color. In a cheese factory you've seen the greenish color in the whey vat? That's G. Under an ultra-violet light the scientists can actually measure the amount of fluorescence, the amount of Vitamin G.

"These vitamins are no longer the sweet mysteries of life," said Dr. Hunter. "They are actual chemical substances. Carotene is transformed to true Vitamin A in the liver, and now we can actually determine how many units we've got in a pound." He has even made a motion picture which shows the vitamins in natural colors.

The stockman deals in pounds and tons. The chemist deals in grams and milligrams. And now these biochemists deal in micrograms. There are 454 grams in a pound, 454,000 milligrams, and 454,000,000 micrograms. Vitamins are tested in micrograms and milligrams, but they are just as actual as pounds in a stock-farmer's language. I saw scale-beams on the Wayne Research Farm on which you could weigh a carload of cattle. I saw scale-beams which would divide a pound of ground corn or alfalfa leaf meal into 454,000 parts.

Dean Henry's pioneer method of evaluating a feed just by the chemical analysis of protein, fat and fiber has gone by the board. Feeds may look alike, smell alike, even taste alike and give widely different results in the feedlot or poultry yard. Only through the biological test for ingredient quality and vitamin content can one be sure of the true nutritional value of a feed.

Mangers That Save Feed

Hay dropped by H. J. Rohlf's beef cattle in Lincoln county, South Dakota, goes back into the hay manger where it may be picked up again. He has a barn 38 feet wide and 54 long with wide mangers that force cattle to put their heads through openings to eat. That gives them little opportunity to drop feed where it will be trampled into manure, and most stockmen consider it the most economical type of hay feeder yet devised. The most wasteful is the slatted rack with no catch manger below. Every time a mouthful is pulled from between the slats of the latter type some of it falls into the manure. Much of the waste consists of leaves when alfalfa is fed, and that is the most valuable part of the hay. The Rohlf barn has a large storage mow above. Concrete floors make it easy to keep clean. —*Cappers Farmer*

The Forest Service Aids Farm Woodland Owners

Charles E. Randall
United States Forest Service

THE owner of a Virginia farm decided that by selling all the timber on his place, he could take advantage of good prices and pay off some debts. He had about 30 acres of young timber and 60 acres of large, mature timber — mostly loblolly pine. Some one offered him $6,000 on a "clear-cut" basis.

The man changed his mind about selling all his timber after consulting an extension man who co-operates with the U. S. Forest Service. He explained that clear cutting would ruin the woods. The upshot was that the owner agreed to leave younger trees on his 60-acre tract for restocking, and not sell any of the young pine in the 30-acre tract, but thin it for pulpwood and fuelwood at a later date. The owner received more than $8,000 on the deal instead of the $6,000 first offered him. Besides the extra profit, he has growing timber left as a "working capital" or investment for the future.

Never before in history have farm woodlands occupied the significant position they hold today. With wood substituting more and more for strategic metals, it is one of the most useful commodities in time of war.

Good farm woods management is vitally important in planning for continuous crops of trees. Farm owners are showing increasing interest in building up their woodlands. Under the Clarke-McNary law the United States Forest Service co-operates with forty-two states, Puerto-Rico, and Hawaii in providing trees for farm woodland and shelterbelt planting. During 1940 farmers and other timber growers planted more than 87 million trees obtained from State nurseries under this program. This is more than twice the number of trees planted five years ago.

For a general picture of the farm woodland situation in the United States, let's turn to the United States Department of Agriculture's 1940 Yearbook, "Farmers in a Changing World." Here we find that about 18 percent of all land in farms is woodland, and on some farms as much as 60 percent of the land is in forest. Most of this woodland is actually or potentially valuable if it is managed properly—land that is impoverished and unfit for

other farm crops will usually grow trees.

Instead of getting building material from a thousand or more miles away and paying high transportation costs, the farmer can grow it for himself. He can also market forest products. In some instances, timber growing has become the principal farm business. Local forests offer an excellent field for co-operative management and the co-operative marketing of timber products by farm communities.

Forest Service reports indicate that farm woodlands on the average produce no more than one-third to one-half of the volume of wood they are capable of producing. Yet they furnish nearly one-fourth of the sawlog supply of the United States. In cash value, forest crops rank tenth among all farm crops. In addition, there are the game, fish, and recreation values of farm forests and the large contribution well cared for woodlands make to the aesthetic values as well as to other values inherent in a well balanced enterprise. About one-third of the privately owned commercial forest area of the country is in farm woodlands.

A farmer unfamiliar with forestry methods is likely to neglect his woodland. He may possibly use it as pasture, permitting cattle to destroy the tender new growth. Or he may cut the best trees on his land for fuelwood—a wasteful practice. To assist woodland owners in managing their woods, the Forest Service has published a number of pamphlets from time to time. Among these are "Care and Improvement of the Farm Woods"—Farmers' Bulletin No. 1177; "Measuring and Marketing Farm Timber"—Farmers' Bulletin No. 1210; and "Southern Pines Pay"—Miscellaneous Publication No. 357. These publications and many others are on sale at low cost at the Government Printing Office in Washington, which will send a price list of all forestry publications for the asking.

The first-mentioned pamphlet discusses such topics as the kinds or species of trees to plant, the number of trees to plant to the acre, which trees to thin, how to protect farm woods from fire, how to spot insect damage and tree disease, the necessary precautions to take in logging, natural restocking by seed, and the growth rates of different species of trees. Short broadcasts on farm woodland management are prepared by the Forest Service in co-operation with the State extenson services.

In some sections of the country a mistaken notion exists that burning the woods in the late winter months is beneficial to growth. To correct this idea and other misconceptions concerning

forest management, the Forest Service carries on an educational program, pointing out that fire destroys valuable soil cover as well as young seedling trees. One of the tenets the Forest Service endeavors to make known is that the farm woods are a savings bank paying interest. "Sustained yield"—the management of forests for continuous production—is the principle involved here.

The importance of farm woodlands in the farm economy was long obscured by the abundant local timber supplies available in most sections of the country. The farmer could buy lumber and other forest products direct from the manufacturer economically because transportation costs were low. This fact accounted for the spacious farm buildings erected in most rural regions a few decades ago.

In many localities the farmer must now look 1,000 to 3,000 miles away for a source of comparable materials, and he pays freight charges often greater than the cost of growing good timber on his farm or in other nearby forests.

The Forest Service holds that farmers can contribute directly to winning the war by cutting down the need for long distance transportation of wood for domestic uses, thus helping to relieve the strain on our already war-burdened transportation system. In addition to growing timber for their own use, many farm woodland owners are profiting from the heavy demand for lumber by selling the better grades at good prices. But the Forest Service warns against destructive cutting methods that fail to provide for a continuously growing supply. Timber will also be needed in the post-war period, both here and abroad.

Fire is a deadly enemy of forests, and the Forest Service, under provisions of the Clarke-McNary law of 1924, co-operates with the State forestry departments to bring private and state-owned forest lands under protection from fire. It is continually working to increase the area under organized protection. Under terms of the law, the Federal Government limits its expenditures in a given fiscal year to an amount not greater in each state than the funds expended by the state and private owners. Federal appropriations, however, have never been sufficient to meet this 50-50 share of the estimated cost of adequate protection of forest lands in the country, and approximately one-fourth of all lands needing protection are still without organized protection from fire.

The Forest Service co-operates with land owners, the Extension Service, and the state foresters in improving small timbered tracts

throughout the country as demonstrated areas in practical farm forestry methods. The demonstrations show practical measures of controlling soil erosion, reducing flood dangers, and increasing woodland values through proper woods practices. They also aid in promoting more intensive protection from fire.

During the past year the Forest Service has co-operated with the Farm Security Administration in aiding farm woodland owners. This agency has many loans secured in part by farm woodlands that, properly managed, could supply wood requirements for the farm and, from the sale of forest products, contribute toward paying off the loans, while at the same time, the woodland resource is being built up instead of being allowed to deteriorate.

Also, the Forest Service has co-operated with the Agricultural Adjustment Administration in developing farm woodland protection and reforestation projects and in administering the naval stores conservation program.

During the coming year the Forest Service will continue to co-ordinate its farm forestry program in line with war needs, assisting farmers to market timber to advantage, and promoting a program that looks to maintenance of a supply of timber for the future.

The Forest Service was established in its present form as an agency of the Department of Agriculture in 1905. One of its big jobs is the administration of the 160 National Forests which cover a total of 176,000,000 acres scattered through 40 States and Alaska and Puerto Rico. The National Forests are administered under a "multiple use" plan which looks to the "greatest good to the greatest number of people in the long run."

Timber in these public forests is under sustained yield management, and may be sold, with supervised cutting. Livestock grazing is allowed on national forest ranges under permit. The National Forests harbor a third of all the Nation's big game, and under scientific wildlife management in co-operation with the States, game populations are rapidly increasing. The National Forests protect watersheds of many of the country's major streams and of hundreds of power and irrigation developments. Included in the National Forests are large areas of cut-over and burned-over land acquired in recent years, and the Forest Service has a big rehabilitation job to do to restore these lands to productivity.

As part of its multiple use of planning, the Forest Service recognizes the value of recreation in the outdoors. Public camp-

grounds with outdoor fireplaces and other improvements are maintained in the national forests, and citizens and their families are welcome to camp or picnic without charge. "Organization camps" maintained by the Forest Service or by co-operating civic or welfare groups on many Forests afford healthful recreation for adults and children in low-income groups. Of late years, with the development of winter sports areas, the northerly national forests have been frequented by winter, as well as summer visitors. The business brought to adjacent communities by such recreational developments is often a real contribution to local income, and by providing permanent supplies of raw materials for local industries, National Forests contribute materially to the stability of many communities.

In thirteen forest experiment stations and at the Forest Products Laboratory in Madison, Wisconsin, the Forest Service conducts investigations to develop more efficient utilization of wood and new or improved forest products, and to devise measures for perpetuating the nation's forest resources.

Forest conservation has made great strides since the turn of the century, but it still has a long way to go. The Forest Service reports that the annual drain on the country's forest resources still exceeds annual growth and that over wide areas destructive practices still continue. The Service has repeatedly recommended increased public action to restore the millions of acres of wasted lands to productivity and sufficient public controls to insure the perpetuation of the Nation's forest resources.

Pulmotor for Calves

Here is a tip to save the newly delivered calf that is barely breathing or not breathing at all, provided the heart is still beating:

Place the tube of an auto tire pump up one nostril. Then compress both nostril outlets with your hand. Force some air into the lungs by a few pumps on the handle. Remove the tube, open the nostrils, and press down on the ribs to force the air out of the lungs. If unsuccessful the first time, try it again.

—*Successful Farming*

A Brief Anthology of Soil Conservation

Condensed from The Land

1728

THE soil we passed over this day was very good. Charming valleys bring forth like the land of Egypt. Grass grows as high as a man on horseback and the rivers roll down their waters to the sea as clear as crystal. Happy will be the people destined for so wholesome a situation, where they may live to the fullness of their days with much content and gaiety of heart.—COLONEL WILLIAM BYRD II, *Surveying the Dan River Valley, Virginia*

1777

Since the achievement of our independence he is the greatest patriot who stops the most gullies.—PATRICK HENRY, *before the Virginia Assembly*

1797

We ruin the lands that are already cleared and either cut down more wood, if we have it, or emigrate into the western country. . . . A half, a third, or even a fourth of what land we mangle, well wrought and properly dressed, would produce more than the whole under our system of management; yet such is the force of habit, that we cannot depart from it.—GEORGE WASHINGTON, *in his Letters*

1813

We now plow horizontally following the curvature of the hills and hollows on dead level, however crooked the lines may be. Every furrow thus acts as a reservoir to receive and retain the waters; . . . scarcely an ounce of soil is now carried off. . . . In point of beauty nothing can exceed that of the waving lines and rows winding along the face of the hills and valleys.—THOMAS JEFFERSON, *in a letter to Charles W. Peale*

1845

If western land-spoilers knew how eastern land-skinners had skinned their land to death, they would not go on doing just the same thing. But they won't know, and, of course, won't do. . . . This is the land of gullies.—SOLON ROBINSON, *writing of Mississippi*

1872

Grass is the forgiveness of nature — her constant benediction. . . . Forests decay, harvests perish, flowers vanish, but grass is immortal. . . . Its tenacious fibers hold the earth in place and prevent its soluble components from washing into the wasting sea.—SENATOR JOHN J. INGALLS, *of Kansas*

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1905

The preservation of the food-giving value of the soil as used by civilized man depends on the efficiency of the means by which he keeps the passage of the soil to the sea at a rate no greater than that at which it is restored by the decay in the materials on which it rests. — NATHANIEL SOUTHGATE SHALER, *Man and the Earth*

1907

To skin and exhaust the land will result in undermining the days of our children.—THEODORE ROOSEVELT, *in a Message to Congress*

1908

The noblest task that confronts us all today is to leave this country unspotted in honor, and unexhausted in resources. . . . I conceive this task to partake of the highest spirit of patriotism.—GIFFORD PINCHOT, *The World's Work, May, 1908*

When our soils are gone, we, too, must go unless we find some way to feed on raw rock, or its equivalent. . . . The key lies in due control of the water which falls on each acre. . . . The solution . . . essentially solves the whole train of problems running from farm to river and from crop production to navigation. — THOMAS C. CHAMBERLIN, *before a White House Conference of Governors*

1911

The Grass roots which formerly held the soil together are decayed and gone, and now when loosened by the plow the soil is easily drifted and blown away.—DR. A. M. TEN EYCK, *Kansas*

1933

We have just begun to think of this whole country as a good farmer thinks of his farm. We have at last been forced to plan. —HENRY A. WALLACE, *Secretary of Agriculture, in a wired message to Western Governors, November 28, 1933*

1935

World War prices said, "Plow!" The Government said, "Plow!" The farmers plowed these rolling hills of Davis County, Iowa, on the Missouri border, for wheat and corn. "Food will win the war," the posters said.

Woodland was hacked away. Grass was plowed under. The hills washed. The water-table fell. Springs went dry. Game went dry and died. Now thousands of acres have been abandoned and the tax situation is catastrophic. — J. N. ("DING") DARLING, *Interview at Des Moines*

1936

Is this the sort of country we want to leave behind us, to be our monument or history? Ravaged land, wasted forests, empty oil wells, and a people starved, stunted, ignorant and savage.

Why do we do it? What strange insanity is driving us to destroy ourselves? — DAVID CUSHMAN COYLE, *Waste*

Our country is . . . like a man well gone with cancer or tuberculosis. . . . With continuance of the manner in which the soil is now being squandered (we have), less than a hundred years of virile national existence (and), probably less than twenty years in which to build up the technique, to recruit the fighting personnel, and, most difficult of all, to change the attitudes of millions of people who hold that ownership of land carries with it the right to mistreat and even destroy their land.—MORRIS L. COOKE, *Engineer, before a Senate Committee*

1937

Too long we have reckoned our resources in terms of illusion. Money, even gold, is but a metrical device . . . not the substance of wealth. Our capital is the accumulation of material and energy with which we can work. Soil, water, minerals, vegetables and animal life—these are the basis of our existence and the measure of our future.—PAUL B. SEARS, *This is Our World*

The affairs of the soil may not have the strange magnificence of the outer universe or the curiosity of the inner recesses of the atom; but they touch our daily lives most intimately. So I commend them to your notice and ask your indulgence for the homeliness of my story. . . .

I propose in this letter (Chapter XVI, entitled *Corruptio Optima Pessima*) to tell you something of the tragic happenings to the soil of the United States. They are not without parallel in other parts of the world, but nowhere else has the drama of soil destruction been played so swiftly and on so great a stage. —GILBERT WOODING ROBINSON, *Professor of Agricultural Chemistry, University College of North Wales, Bangor, in Mother Earth or Letters on Soil, a book published in London*

Given one of the richest and most beautiful lands on Earth to tend, we have taken shamefully poor care of it. . . . How can a people work themselves into such a squirm of patriotism when some misguided schoolchild refuses to salute the flag, this land's symbol, yet countenance and join in a continual defacement and destruction of the body of the land itself?—RUSSELL LORD, *Behold Our Land*

1939

Why do we not teach conservation in our schools? Is the waste and pillage and threatened physical destruction of our country less important than the names of State capitals?—HAROLD L. ICKES, *Secretary of the Interior, February 27, 1939*

Damage to the land is important only because it damages the lives of people and threatens the general welfare. Saving soil and forests and water is not an end in itself; it is only a means to the end of better living and greater security for men and women.—HENRY A. WALLACE, *To the Land Grant College Association, November 17, 1939*

The plain truth is that Americans, as a people, have never learned to love the land and to regard it as an enduring resource. —HUGH H. BENNETT, *Soil Conservation, Chapter I*

1940

While we move to be ready to defend this land, we are already forgetting the land we defend. I mean the *land*—the actual earth out of which our food grows and our forests. . . . I lack the faith that freedom for many of us could flourish in a desert. It does not flourish now in America where the land is too worn for men to farm it in security.

I was only one of those who got the recent letter (July 15, 1940) from Friends of the Land, announcing suspension of their activities until other times. This organization of conservationists said:

". . . With death striking out of the sky at helpless women and children, with hunger stalking in many places, with refugees thronging the highways and seaways, it is understandable that established organizations dealing with the alleviation of such anguish should have first call. . . . Nevertheless, we have it always to remember that during the tumult and excitement of the first World War we skinned and beat down much of our land, and inflicted permanent destruction to resources that cannot be replaced. . . ."

Nobody expects as much excitement now over a gully as over a gun. Certainly conservation is not competing with preparedness. But it is time people began to realize that conservation is a part of preparedness. . . . Once war is here we cannot stop to count the consequences of cutting down the pine trees—to weep for the washing of our hills into our rivers. But we can recognize that in any intelligent program of preparedness that our strength is still in our earth. — JONATHAN DANIELS, *in The Nation, August 31, 1940*

Should Potatoes Be Planted Thick or Thin?

Condensed from Eastern States Cooperator

K. E. Paine

HOW many seed potatoes should be planted per acre? This is a question often asked and much discussed by potato growers. Many experiments have shown that within reasonable limits the total yield produced is often in direct proportion to the amount of seed planted per acre. The highest total yield obtained by using a very large amount of seed per acre may not always be the most profitable, however. Obviously, the amount of seed used per acre will be determined by the size of the seed pieces and the spacing—distance between rows and pieces in the row.

Size of seed pieces. The size of the individual seed pieces should each be large enough to carry at least one strong eye and to contain sufficient food material to supply adequate nourishment to the young plant for as long a period after planting as it will be benefited thereby. Some research indicates this to be about six weeks. The size of seed pieces into which tubers can be effectively cut is affected by the variety and the number of eyes per tuber and the size or grade of the tubers. Large Katahdin tubers with few eyes cannot be cut into as small seed pieces as can moderate-size Cobbler tubers with many eyes unless considerable portions of each tuber were discarded. One to two ounce seed pieces are usually considered quite satisfactory. Under favorable soil conditions of moisture, temperature and fertility, three-fourths-ounce seed pieces may be large enough. It is seldom desirable to use pieces smaller than that.

Spacing distances. Many factors and conditions affect the most desirable spacing distances. Each should be considered in relation to all the others. Here are a few of them:

The potential productivity of the soil as determined by the organic matter content, the plant nutrient supply, amount of rainfall, drainage, temperature and length of season.

Cultural practices to be followed including depth of tillage, time of planting, equipment available for planting, cultivating, spraying and harvesting, and extent and effectiveness with which that equipment is to be used.

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Quality of seed to be used considering amount of disease contained, general vitality, size of seed pieces and number of strong eyes on each seed piece.

Price and availability of seed compared with the value and area of land available and the probable selling price of the crop produced.

The greater the productivity of the soil, other factors being equal, the closer spacing is practical. Spacing distances, particularly distance between rows, must be such as to match the size or possible adjustment of equipment available; and the more effectively that equipment is to be used to prepare a deep, loose seedbed to control weeds, insects, and diseases, the closer it should be desirable to space seed pieces in the rows.

Good-sized seed pieces with several strong, viable eyes on each, containing little or no disease, and so stored and handled as to maintain high vitality, need not be spaced as close as seed of poorer quality to give full usage of land and space. If seed is high-priced and land area available is unlimited, smaller seed pieces and spacing at greater distances will produce more crop per bushel of seed. But if seed is low-priced and land use costly and limited, larger seed pieces and closer spacing will give most crop per acre. A higher level of production obtained by closer spacing of larger seed pieces is more profitable when the crop sells at a high price than when the sale price of the crop is low.

When all factors are considered and weighed and size of seed piece and spacing distances decided upon, the following tabulation can be used to determine the amount of seed needed per acre.

Number of 100-lb. Bags of Seed Potatoes Required to Plant One Acre

Size of Seed Piece in Ounces	32 Inch Rows x				34 Inch Rows x				36 Inch Rows x			
	8"	10"	12"	14"	8"	10"	12"	14"	8"	10"	12"	14"
1	15	12	10	9	14	11⅓	9½	8	13	11	9	7⅔
1½	23	18	15	13	22	17	14	12	20	16	13⅓	11
2	30	24	20	18	29	23	19	17	27	22	18	15½

Saving Cotton Growers $15,000,000 A Year

Condensed from Missouri Ruralist

OF all the many governmental organizations and institutions in this country designed to benefit the farmer, few have done more than the United States Cotton Ginning Laboratory, at Stoneville, Mississippi.

Established in 1930, the ginning laboratory already has made contributions worth thousands of dollars to the Cotton Belt. Seldom do we find a more efficient and practical research program.

Cotton still belongs to the farmer while it is going through the ginning process. Other products, milk, soybeans, vegetables, livestock, grain, all are sold as they leave the farm and the farmer has no responsibility from then on. Poor ginning means money out of the grower's pockets, money estimated as high as $15,000,000 a year.

The ginning laboratory at Stoneville, which covers all phases of picking, handling, ginning and packaging cotton, is in the heart of the great Delta country. The Delta is one of the greatest cotton sections in the world, and in recent years Missouri has shown its heels to the entire Cotton Belt in yields and now in quality of cotton. It is fitting that this laboratory, the best of its kind in the world, should be well in reach of growers and ginners.

Every year a group of cotton men go to Stoneville to observe the operation of various types of gin machinery and have explained to them the operation and maintenance of the different units. They have asked questions as to the solutions of their problems and have visited modern commercial gins in the vicinity of Stoneville where the developments of the workers at the laboratory have been applied.

From all over the cotton sections of the nation growers, ginners, extension specialists, even mill owners come to learn the latest in ginning.

Findings of the laboratory have been put to practical use by the leading manufacturers of cotton-gin equipment. For example, all manufacturers now recognize the advantage of increased speeds for modern gins in terms of improved cotton quality and economy. On basis of laboratory reports, seed-roll boxes and gin saws have been redesigned, with benefits to both farmers and ginners.

About 150 new complete gins having these features and other improvements were installed in

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preparation for the 1940-41 ginning season. And more than 1,300 cotton driers, a device developed at the laboratory, were in operation during that season in the Cotton Belt.

Virtually all types and makes of standard ginning equipment are found in this laboratory. This equipment is installed so as to permit the operation of each unit under wider ranges of conditions than would likely prevail in a commercial gin in any part of the Cotton belt, except the arid area. In most of the tests at Stoneville, conditions like those in a commercial gin are duplicated. In other tests, measured variations are produced, so that their effect can be noted.

But the ginner can't make good cotton from poor cotton. The condition of the seed cotton as it is brought to the gin, both as to moisture and foreign matter, has a great deal to do with the grade of the ginned cotton. Tests show that in picking cotton carelessly much trash is included and losses will range up to $5 a bale. Modern cleaning, extracting and conditioning machinery can, of course, take out a lot of this trash before the cotton reaches the gin stands. But tests also show that even the most elaborate cleaning equipment can't entirely offset careless picking. Prompt and careful picking are essential to good ginning.

When we ship cotton to other parts of the world they have complained that our bales have been unsightly and inadequately protected from the weather. Considerable work on this is being done. One important contribution of the laboratory has been a metal tag which can be securely anchored in the bale in such a way as to prevent its loss or damage during the process of compression and during handling from gin to market. This tag is legible even after the bale has been destroyed by fire. Through the use of the tag objectional bales can be traced to their original owners.

Speaking of compressing, the laboratory is working with covers for compressed bales. They also are working with round bales of cotton, which also are highly compressed. Other presses that produce a high density bale at the gin are being studied.

During these times of war even the cotton ginning laboratory plays a part. We saw experimental bales of hay that had been compressed for army use. These little bales each contain enough hay for one mule for one day. Thus each mule carries his own hay rations.

A total of 17 public patents have been obtained by the Cotton Ginning Laboratory, and these are available to everybody.

Meal In Silage

Condensed from The Jersey Bulletin

Prof. Oscar Erf
Ohio State University

SEVERAL years ago at a scientific meeting held at Randleigh Farm, Lockport, N. Y., the question came up as to a more economical way of preparing grass silage in which we could preserve all the nutrients in a reasonable manner as in the green grass. We had accomplished this for five years repeatedly by cooling the grass to a freezing temperature and keeping it below freezing. The grass when removed from the refrigerator was apparently in as good shape as at the time it was put in. Apparently no losses occurred during the storage season. But this problem becomes somewhat impractical, since the cost of keeping the grass in this state and cooling from the field is rather expensive.

Several hundred methods were instituted at Randleigh Farm to determine a practical way of preserving the green grass — with CO_2, the various kinds of acid, low and high temperatures, and with a low and high water content.

In all these cases, strange to say, the grass with the high water content suffered the most in the preserving method except in the case of freezing.

About 35 years ago it was my privilege to travel through Italy. I found on a farm there a cistern in which they stored beets sliced in small particles and mixed with corn meal. The material that was taken from these cisterns was very well preserved. However, I do not know anything about the chemical action that was going on in the cistern. According to literature, this practice was formally adopted by the Egyptians a good many centuries before.

Upon traveling through Canada I encountered a second method. This man had dug a trench about 2 feet deep and had sliced his potatoes and mixed them with corn meal and covered them over with earth. I happened to see the potatoes in February. They were well preserved. They were more or less frozen at the time, but they were put in slop form for the pigs and the pigs did thrive on these potatoes. I saw a lot of pigs that had never received anything but these potatoes with the

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exception of a little meat meal. I would have considered them a very ideal lot of pigs. At the time, the man was thinking of selling his pigs and feeding the balance of the preserved potatoes to his cows. Later I heard that the results of this were very satisfactory.

I remember in 1914 after these experiments, we filled a silo with clover hay and added 200 pounds of ground corn per ton. The hay was somewhat discolored because of the clover in which naturally the chlorophyll turned dark at the slightest amount of oxidation. The hay was relished by the animals. It did not have a very sour taste. No chemical or bacteriological analysis was made of the hay. Therefore, we knew little about what the preserving process was after we fed the clover silage in the silo, except that it seemed to be palatable to the animals.

On account of the amount of corn that was used, the question arose whether it was practical to use corn with the grass silage. At the time we knew little about the value of vitamins and the necessity of the nutritional factors since the practice was not carried on. In the past few years we have come to know more about the value of vitamins and the enzymes in green grass as a necessary feeding material for cows. Consequently arrangements were made to mix corn with the green grass in 32 experiments in order to determine the chemical and bacteriological action. On the grass it varies as to the time of the year, and also the degree of moisture that it was necessary to have in order to properly maintain the green grass in good preserving condition.

This year we filled one silo with alfalfa in which the percentage of moisture was 60 percent or less when it was put into the silo. We mixed with this 100 pounds of dry corn meal. In half of the silo we introduced a lactic acid culture in order to convert some of the free sugar into a lactic or another form of acid which is a preserving factor, or convert some of the starch of the corn into acid. The silo was opened on January 7 this year and to our surprise an ideal silage from a biological standpoint was found which is greedily eaten by the cattle. So far, the cattle have been doing well on it. We do not know as yet the chemical or the bacteriological action of this fermentation which is now in the process of determination by our chemist, Joseph Katzenberger. The bacteriological work is being done by Dr. Wiesor and the vitamin work is being done by Dr. Inman of Antioch College.

This year when molasses and phosphoric acid are hard to get, we find that fine corn meal is

ideal, in fact it seems like a better substance than the others. Corn meal is available on every farm and can be purchased at any elevator. It is easily applied at the time the grass is run through a cutter with a blowing attachment. The blower thoroughly mixes the corn meal with the grass. So far we have found the corn meal to be very favorable preserving material, in fact better than any other preservative except freezing.

Find the Metals in Feeds

Condensed from The Michigan Farmer

H. R. Smith

IS the more general practice of baling hay to conserve barn space an important cause of present-day losses on cattle, resulting from metallic objects in the stomach?

Are small feed mills which do not have magnets to remove metals partly responsible?

There has come to our attention a large number of cases where cattle have died suddenly on farms and when autopsied wires or nails were found penetrating the heart.

During the 6-months period ended June 30, 1940, a total of 2,199 beef carcasses were condemned as inedible under federal meat inspection in the United State from pericarditis—inflammation of the membrane surrounding the heart. Nearly all of such cases result from wires or nails entering the heart membrane from the stomach.

For the next 6-months period ended December 31, 1940, there were 2,360 beef carcasses condemned for pericarditis under federal meat inspection in the United States. Here was a loss of approximately $350,000 for the year.

In 1940 there were 510,858 beef livers condemned for abscess under federal inspection in the United States, constituting a loss of approximately $1,000,000. From recent observations on 2,042 cattle slaughtered in Chicago and Omaha, metallic objects were found in the stomachs of 670 or 30 per cent of these cattle, and short pieces of baling wire or nails were found penetrating the livers in 387.

The writer, in drawing a magnet through alfalfa meal, has col-

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lected splinters of wire too small to be detected in the stomach and yet large enough to cause an abscessed liver or even pericarditis. Therefore, the damage is probably greater than the above figures indicate.

Animal pathologists say that abscesses may be formed from such objects in the stomach even though they do not penetrate the liver. Dr. E. T. Hallman of the Veterinary Division of Michigan State College writes as follows:

"Blood, upon leaving the stomach of the cow, passes through the portal circulation to the liver before reaching the posterior vena cava. There is always a probability that any foreign body forced into the wall of the stomach may carry infectious organisms directly into the capillary circulation of the stomach, in which case the liver becomes the first organ after the stomach exposed to such infection.

"Another possibility, perhaps not as important as the above, is that the reticulum lies in contact with the visceral surface of the liver. Therefore, any foreign body protruded into that portion of the wall in contact with the liver may carry infection directly into the liver."

If 30 per cent of the abscessed beef livers are infected as a result of metallic objects in the stomach, the annual loss would be approximately $300,000 on those condemned under federal inspection, making a total loss of more than $650,000 on beef carcasses and livers condemned under federal inspection in one year as a result of metallic objects in cattle feed. If we include state and city inspection, the loss would be more nearly $1,000,000 per year.

The number of sheep livers condemned for abscess is relatively small, perhaps because sheep are much more likely to reject metallic objects from the feed than are cattle.

It is impossible to estimate the loss on cattle that die on farms from nails and wires penetrating the heart, but it would greatly exceed $1,000,000 annually.

Many cattle die on farms from metallic objects penetrating the heart membrane and the owner is not aware of the cause. The animal is in pain and avoids movement. The head is sometimes stretched forward and the back arched. They lie down and almost immediately get up.

It is of particular importance in times of emergency like the present to prevent all losses of this character in order to conserve the nation's meat supply. Cattle feeders are urged to watch carefully that wires and nails are not mixed with the feed.

Lower Beef Costs

Condensed from Capper's Farmer

WORK done by scientists of the Missouri Experiment Station on beef making from forages serves the wartime emergency in two ways:

First, it affords a way to lower beef production costs, immediately, which is important in the face of inevitable advances in general farm expense, and also in the future when readjustment shall be necessary.

Second, it suggests a way to make marginal land carry its portion of the war obligation in a period when every acre, of whatever productive capacity, may be sorely needed.

Dr. W. C. Etheridge and C. A. Helm, of the Field Crops department, experimented with Korean lespedeza, and by growing it with small grain, developed a new concept of cropping. E. A. Trowbridge and Albert J. Dyer, of the Animal Husbandry department, seeking information on producing acceptable beef at lower costs, saw possibilities in the forage system. The 4 men undertook a co-operative investigation for utilizing the land, and the combination crops it produced in beef making.

The final lot of steers after being fed legume hay and silage 2 winters and grazed on Korean-small grain pasture 2 summers, went to market weighing 1,156.96 pounds a head, graded "low good," brought $11, and dressed 60.3 per cent. They made beef as good as 75 per cent of that sold through retail markets, even though they had received no grain other than that contained in the silage.

A second trial was started the fall of 1940, with 120 calves from the same Texas ranch as the first group. Inasmuch as the first test had proved that acceptable beef could be made from forage, an effort was made in the second to learn if still greater utilization of sod crops might be practical. Accordingly, 1 lot of 16 steers each was fed alfalfa silage and alfalfa hay and another winter barley silage and alfalfa hay, against other lots which received corn silage and alfalfa hay; corn silage, alfalfa hay plus cottonseed cake; sorgo silage and alfalfa hay.

Eighty-one of these steers were turned to 80 acres of wheat-Korean pasture April 25, when they averaged 495.52 pounds. They varied considerably in weight and condition according to the winter rations. Average gain for the summer, up to October 14, was 264.32 pounds a

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head, and 68 pounds of that was made from April 25 to May 27 on small grain pasture.

The lot wintered on corn silage and alfalfa hay made a feedlot gain of 154.78 pounds and a pasture gain during summer of 237.06 to total 391.84. Those which were wintered on corn silage, alfalfa hay and cottonseed cake made a lot gain of 201.33 pounds and a summer gain of 211.12 to total 412.45. The alfalfa silage and alfalfa hay group had to be bolstered with a little corn during the winter and gained 107.2 pounds, but added 286.84 pounds on pasture to total 394.04. Sorgo silage and alfalfa hay accounted for 72.93 pounds a head gain in winter and these steers gained 292.89 on pasture to total 365.82. Steers on barley silage and alfalfa hay made a winter gain of 86.67 pounds and a summer gain of 285.5 to total 372.17 pounds. Both the sorgo and alfalfa silage were considered to be below average quality. The corn was better than average and the barley about average.

Farmers interested in marketing a maximum of sod or sowed crops through beef cattle, will note performance of steers fed alfalfa silage and barley silage. The alfalfa silage lot lost weight the first 28 days and corn was added to their ration. During the 98 remaining days they averaged 2.85 pounds shelled corn a day, and gained 107.20 pounds each for the winter period. They made a good pasture gain which brought their average for both periods 2.20 pounds above the corn silage and alfalfa group.

The barley silage lot gained 86.67 pounds during the winter and 285.5 on pasture. While the total was nearly 20 pounds below the final gain of the corn silage and alfalfa hay lot, it is apparent that a farmer couldn't afford to spend much in providing corn silage for that amount of beef.

Twenty of the steers were placed on winter barley pasture October 14 and 16 went to a permanent pasture of bluegrass, red top and lespedeza. At the close of the grazing season they were again lotted for wintering on roughage.

A comparison of wheat-Korean pasture, as utilized at the Missouri Experiment Station, is afforded by a bluegrass grazing test at Sni-A-Bar farms in Jackson county, Missouri, where 20 yearling steers were rotation grazed on 25 acres. They averaged 524.1 pounds April 15, 1941, and 701 pounds October 27, a gain of 176.9 pounds apiece. Another lot of 20 yearlings were continuously grazed on 25 acres of bluegrass from April 15 to October 27. Initial weight was 523.4 pounds, and that at the close of the pasture season 725 pounds, or a gain of 191.6 pounds.

"The Baby Pig Disease"

Condensed from American Hampshire Herdsman

From the Illinois Experiment Station, "Animal Pathology Exchange"

DURING the past 8 years scattered outbreaks of a highly fatal disease of new born pigs have come to the attention of the Illinois Agricultural Experiment Station. This strange malady is popularly called the "baby pig disease." In connection with different outbreaks on widely separated farms, an increasing number of affected pigs have been delivered to the laboratory for examination, while a limited number of affected herds have been inspected to observe methods of managing the bred sows.

The extent of the loss in 25 herds ranged from 1 to 22 litters, representing from 5 to 95% of the pigs farrowed during a single farrowing season. Litters from both sows and gilts have suffered losses. A large number of sows and gilts with affected pigs have been rebred and have farrowed litters that did not develop the disorder.

In typical cases apparently normal pigs varying from approximately 24 to 72 hours old show symptoms of shivering, dullness and lack of appetite. They have a tendency to hide and burrow under the bedding. Frequently, when disturbed, they make a weak crying squeal. Coincident with the loss of appetite and onset of weakness, the hair coat becomes rough, the skin cold and clammy, the heart action slow and feeble. The body temperature is normal, becoming subnormal in the last stages.

Finally, the affected pigs lapse into coma. Death of several or all pigs in the litter often occurs within 24 to 36 hours after the first symptoms. In one herd several litters showing typical symptoms died while several surviving unthrifty pigs 3 to 4 weeks old showed low blood sugar levels associated with lesions of the skin. A number of these pigs made satisfactory recoveries when fed milk.

Autopsies frequently reveal a large mass of curdled milk in the stomachs of affected pigs. On the other hand, the absence of milk in some pigs suggests that these pigs had not nursed, or had nursed only to a limited extent between the time of birth and the onset of the disease.

Tissues of the diseased animals were examined for the presence of pathogenic agents, such as bac-

Reprinted by permission from the American Hampshire Herdsman

teria, filterable viruses, protozoa and toxins; likewise, the stomachs and intestinal contents of affected pigs as well as the milk of the sows with affected litters. None was found in any of the cases. "Baby pig disease" was also found not to be the after affects of cholera, flu or erysipelas.

The state of nutrition of the sows and gilts in the outbreaks studied was usually good, and in some instances the owners were inclined to believe that the high condition of the sows at farrowing time might be associated in some way with the disease. With few exceptions, the sows and gilts with affected late winter or spring litters were fed rations that included yellow corn, a protein supplement and either a simple or complex mineral mixture. Oats, and in some cases wheat by-products, formed a basic part of the ration. Sows and gilts farrowing fall litters that developed the disease usually had access to legume or blue grass pasture. The disease, therefore, does not seem to develop from a nutritional deficiency; but on the basis of laboratory investigation may bear an indirect relationship to the quantity of feed consumed by the sow or gilt during the last few weeks of pregnancy.

No significant abnormalities have been found in the constituents of the urine and blood of the pigs in affected litters with the exception of the blood sugar. Additional data are desirable, however, before definite conclusions can be reached with respect to the other blood constituents.

Littermates to the affected pigs that had once nursed at 120 to 140 hours of age show a striking resistance to the disease. Some after 140 hours of age have been fasted for as long as 7 days and at the end of the trial their blood sugar concentration was still well above the danger level. They remained active and fairly vigorous throughout the fasting period and did not develop symptoms of the disease.

Since all the factors responsible for the occurence of the baby pig disease in newly born pigs have not been established, it is not possible as yet to prescribe complete measures of prevention. Nevertheless the following measures appear to be worthy of consideration.

1. A liberal grain ration should be fed to sows and gilts during pregnancy, particularly during the last few weeks of gestation. The common practice of drastically reducing the amount of concentrates fed during the last few weeks or ten days of pregnancy may prove to be an unwise procedure, as developing pigs in the uterus require increasing amounts of essential nutrients. Furthermore, a prompt and sus-

tained flow of milk is essential to the new born pig.

2. During the first 72 hours new born pigs should be watched carefully for symptoms of not sucking, loss of condition, rough hair coat and decreased vigor. If symptoms appear, the pigs should be fed by hand although caution should be exercised to prevent scours which may result from overfeeding. Precaution should also be taken to prevent chilling of pigs.

3. If the sow does not appear to have an adequate flow of milk when given a liberal supply of concentrates and free access to a wholesome supply of water, the use of a pituitary extract may be tried to increase the flow of milk.

In the early pre-coma stages of the disease, injections of a glucose solution supplemented by frequent hand feedings of sugar solution or milk may be expected to result in a fairly high percentage of recoveries. The optimum strength and the amount of glucose solution for affected pigs have not been determined. The administration of a sterilized 40% solution in 5 to 10 cc. doses has been quite effective when distributed over a 24 hour period and usually does not have to be continued longer than 3 or 4 days. Baby pigs soon learn to drink from a shallow pan or trough.

EDITOR'S NOTE (American Hampshire Herdsman): Among the many pork producers in Illinois, Minnesota and other Cornbelt states experiencing difficulty with the "baby pig disease" is Timberline Farms. Working there with the co-operation of Dr. Graham of the University of Illinois, Dick Hollstein had first hand experience in combatting the disease. Dick says that a very distinct sign of "baby pig disease" is hair standing on end like a porcupine. At Timberline they found a glucose solution administered to the pigs with a pipette was very effective. They are now planning to feed molasses added to mash feed to their bred sows for a couple of weeks prior to farrowing this spring.

It is reported by Dr. L. S. Palmer that at the Minnesota Experiment Station they have noted a resemblance of the "baby pig disease" to mastitis in cattle—the milk of sows with affected litters was high in chlorides and low in lactose. They got good results by feeding dry immature grass of guaranteed carotene content or "green milk extract" to the bred sows prior to farrowing.

Organized to Produce

Condensed from Extension Service Review

Byron Demorest

Editor, Omaha Daily Journal-Stockman

NO matter how well you may be posted on such matters as co-operative farm effort, the chances are that you never heard of another livestock feeding group quite like the one that makes up what has come to be known as the "Schleswig Community" in Iowa.

In the commonly accepted sense of the term, the Schleswig area feeders are not members of any co-operative organization. Each runs his own farm and operates on his own money or his own credit. Yet, in a broader way, the system of beef production these feeders have evolved is probably as mutually helpful as that of any so-called co-operative group in the country.

According to County Agent Paul A. Johnson, who has made a close study of operations, the system under which beef is now produced there had its beginnings 34 years ago. It was then that Ed Reimer, long one of the leaders in the community, started buying calves and producing baby beeves.

Prior to that time, the feeding animals purchased by farmers had been 2- and 3-year-old steers, just as they were in practically every other part of the country. But Mr. Reimer and a few of his associates discovered what the feeding world as a whole has since learned; namely, that since calves both grow and fatten, they make more economical gains than other cattle, and they are particularly adaptable to full-feeding on pasture.

Quick to see the advantages of the system was the late Theodore Rohwer, veteran Schleswig banker. Through his encouragement and later that of his son, Julius Rohwer, who now heads the bank, and the co-operation of many of the leading feeders, the "Schleswig system" has been evolved.

There is nothing complicated about it. Feeders buy calves and light yearlings in the late fall and early winter. They start their cattle on oats and alfalfa or clover hay, and gradually add ground ear corn in sufficient quantities to bring the cattle onto full feed by the first of April.

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Cattle are watched with especial care whenever feed is being changed. If a man is new to the territory, some of the older heads drop past his place, and either tell him he's doing all right or suggest a change here and there. For a period during the summer, the stock is fed on pasture. Then it goes back into the dry lot for finishing.

Favorable marketing times also have been carefully worked out. Many of the cattle are shipped in September, long one of the higher months of the year for prices on good fat stock. Others go to the big carlot shows, some to the Ak-Sar-Ben at Omaha, and many more to the International. The rest are marketed in December and January, for the plan—and it is worked out just as carefully as the feeding program of the community—is to sell half of the crop by the end of October and the balance by the end of January.

"When a man goes to the bank to negotiate a loan there, he gets a continuing service in addition to the credit," County Agent Johnson explained recently. 'First, some officer of the bank, usually Mr. Rohwer, sits down with the borrower and figures out, before the cattle are bought, what they can be expected to gain, what that gain will cost, and what they will have to bring at marketing time to pay out. If that final figure looks too high, ideas of purchasing prices have to be scaled down, or the loan is not made.

"Then, if the borrower is a new man, some representative of the bank, usually a neighboring feeder keeps an eye on the stock to make sure that the approved methods of finishing are being followed and that everything is going well. If the suggestions that are made are not followed, that man will find it hard to borrow any money the next year. Members of the Schleswig community know that their plan will work for anyone who follows it.

"It is the same way at marketing time. That goes according to plan also. At the same time, the community and the bank will stand behind anyone who is willing to go along and follow the established program."

The Crawford County Beef Producers Association holds 2 or 3 meetings each year. At the first meeting, 70 persons attended; last January; 680 folks packed our new community hall at Schleswig.

"It has taken more than 30 years to standardize our methods, but we feel that the results justify our efforts. It is a program of profitable beef production and of good soil management and improvement."

One big factor in the success of the Schleswig "meat manufactur-

ing system," as it is called, is the complete absence of jealousy among the various members. Some operate on a larger scale than others; but, instead of envying the more outstanding individuals, the whole community is proud of the exploits of any of its members. Possibly that is because everyone has found the plan profitable.

Mr. Reimer, recognized leader of the community, with more than 35 years of experience in feeding cattle, summarizes the system thus: Grow as many acres of clover and alfalfa as you need. The number and kind of cattle fed depend on the amount and the kind of roughage the farm produces and also the amount of good pasture. Buy the best quality feeder calves you can get. It does not pay to feed a poor quality calf. Buy calves. Put them on full feed and a long feed. Do not try to rough them on cornstalks or poor pastures. How soon they start making money for the feeder depends on how soon they are eating enough grain. "The eye of the master fattens the flock." That includes regularity of feeding, plenty of good water, clean feed lots, and bunks watched so as to prevent the accumulation of sour or moldy feed.

Anyone who would like to see for himself what the Schleswig community has accomplished will find that the feed-lot tours which are held there once or twice a year afford excellent opportunities for investigations. A dozen or more typical farms and feeding plants in the community are visited on each tour, and nowadays it is customary to conclude the tour with a barbecue.

About 800 made the tour last fall. That was all right with the Schleswig folk. They are justly proud of their accomplishments and were happy to have a chance to show the rest of the world what they have done.

Good Rooting Soil

A spring seeding of alfalfa in oats hasn't failed in 14 years at the Roy B. Smith farm in Tipton county, Indiana. The seeding follows corn. Smith lets hogs run in the field all winter to firm the ground well. In spring he disks lightly and seeds. There are no air pockets in such a field and virtually every plant roots successfully.

—*Cappers Farmer*

Pigeons That Drill for War

Condensed from New Jersey Farm and Garden

IN these days of mechanized warfare, with the nation straining every effort to provide tanks, planes and ultra-modern radio communications for its expanding army, a group of buildings at Fort Monmouth, N. J., provides striking contrast to the most spectacular phases of our current preparedness program.

These buildings, four in number, comprise the pigeon training center of the United States Army Signal Corps and were built to provide every facility for the breeding, comfort and training of the feathered messengers who can carry dispatches through shot and shell when telephone lines are down and radio can't be used.

Since the pigeon center was completed in 1938, hardly a day passes that private breeders do not come to inspect it. The twenty lofts, which are considered among the finest in the country, occupy four buildings with a fifth set aside for administrative and workshop activities.

In designing the lofts the Signal Corps incorporated every facility for the development of an adequately trained force of pigeons; each pigeon has its own private apartment to which, after each flight, it returns unerringly for waiting food and drink. Food rations are generous and running water is provided, but—and this usually surprises visitors—there is no heating system because of the danger of pneumonia. Battalion Sergeant-Major Poutre explains that the birds must fly in all kinds of weather and that to take them from a hot loft and subject them to an exhaustive flight in cold weather, especially cold, rainy weather, probably would kill them.

Birds receive their first training at the age of about four weeks and show their intelligence, or lack of it, as soon as they are taken from the nest and left to fend for themselves. Young pigeons, like raw recruits, show varying degrees of intelligence.

At the start of their training they are made familiar with their home, especially the entrances and exits. They are placed on the outside landing deck and shown how to enter the loft by pushing aside the pendant wire bars. Before they are six weeks old the capsules in which messages are carried are tied to their legs for the first time. At first the young birds don't know quite what to make of the cylinder but usually,

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after a flight or two with a message tied to its leg, the pigeon accepts the capsule as part of its routine.

In the beginning of their training the birds are given exercise flights at the pigeon center, never flying more than a few hundred feet away from the nests and with most of their flying inside circles over and around the familiar lofts. Later they are placed in baskets and taken a few miles away for their first trial flights. They begin racing in their first year, with seven or eight years as the average period of their usefulness.

There are from twenty-five to thirty-five birds in each of the twenty lofts at the Fort Monmouth center. The Signal Corps co-operates with private fanciers in conducting races, with thousands of birds competing weekly in races ranging from 100 to 500 miles. In a recent contest 7,046 birds from 906 lofts participated. Because of this co-operation, army officers estimate that they will be able, in an emergency, to obtain overnight 50,000 trained pigeons as well as the men to care for them. England is reported to have 20,000 pigeons in service at present.

One veteran at Fort Monmouth has carried his band for nearly twenty-four years. Affectionately known as "the Kaiser," the bird was found by American soldiers in a basket abandoned by German troops in the Argonne campaign in the first World War. Its band bears the royal crown of the former German empire, and band numerals indicate 1917 as the year of birth.

Following the war, Sergeant-Major Poutre learned from German pigeon clubs that "the Kaiser" had been bred by Hans Zimmerman, of Coblenz. Two years ago Poutre sent to Zimmerman a son of "the Kaiser" which even now may be with the Nazi troops in the present war. Only pigeon survivor of the World War and reputedly the oldest homing pigeon in America, "the Kaiser" is the Signal Corps' especial favorite, although his carrying days have been over for many years.

Fitting Steers For Show

Condensed from The Shorthorn World

J. B. McCorkle
Columbus, Ohio

BEFORE starting to feed steers it would be well to consider the all important problem of selecting the right type of steers. A steer must have short legs and a wide, deep body before he is worthy of consideration. Most steer judging is done from the rear of the animal and so it is important to select a steer that is thick and deep in his hind quarters. He must be smooth and compact at the hooks and should carry his width evenly throughout and especially from the hooks to the pins.

We all know that flank meat is relatively cheap in price, but an animal that is cut up either in the hind or fore flanks is lacking in balance as viewed from the side. It is necessary, therefore, to give this point consideration in the selection of a prospective show steer.

Another matter frequently overlooked is that in regard to the hide, whether it is thin and pliable or thick and tight. An animal must have a pliable hide in order to accommodate the accumulation of fats. Ribs should be closely placed in order that the animal will stay smooth as it becomes fat. Coarse, "washboardy" ribs are not inducive to a smooth covering of flesh. I remember showing five times against the 1932 International Champion steer during the fall of that year. I defeated him on every occasion except under Judge Bigger at Chicago, and was defeated solely because my steer had a bare place over the ribs on each side about the size of your hand. This steer never would have covered over this particular area as his ribs were coarse and far apart.

Perhaps we should give more thought in regard to keeping the steers smoothly and firmly fleshed. So many of the steers in the heavier classes possess rolls of fat on the short ribs and excessive gobs of fat in the area of the tail head. This is all waste and naturally detracts from the appearance of the animal. Rough fleshing qualities may be prevented to a considerable extent by reducing the corn and total quantities of grain when the animal shows signs of becoming coarse.

In order to feed heavyweight steers properly I have found it advisable to begin with the steer when he is a baby calf, leaving

Reprinted by permission from The Shorthorn World, Aurora, Illinois, Feb. 25, 1942

him with his mother at all times with the exception of a few hours during the middle of the day. I like to follow this procedure until the calf is about two months old, when he is permitted to nurse twice a day. The calf is turned into a shed for a few hours each day with other calves of his own age and fed a ration of equal parts of whole shelled corn and whole oats along with all the timothy hay the calf will eat. I believe in getting the necessary protein for the well being of a nursing calf from its mother or a nurse cow. In my experience, the feeding of alfalfa hay or any protein supplement to nursing calves has not proven satisfactory as a ration strong in protein frequently causes scouring.

Clean, palatable feed should be available for young calves at all times. A calf will consume only a small portion of feed at a time, but it will eat frequently and by so doing, it develops an appetite for grain. When the dam's milk flow begins to decrease, a nurse cow should be afforded and the calf should be permitted all the milk he will consume, providing bloating or other digestive disturbances do not occur. When bloating occurs milk should be reduced and restricted to a definite quantity. There are many individual needs that will necessitate careful attention during the feeding program. No two calves respond alike to similar conditions.

When the calves have reached six months of age I crack the grain very closely, and change the ration to equal parts of cracked corn, crimped barley, crimped oats and bran with a limited amount of hay. This ration is moistened with a mixture of beet pulp and molasses and is fed during the first summer the calf is on feed.

When the calves are six months old, they do better when fed in pairs. During the fall and winter months it has been my practice to use cooked feeds. A ration composed of equal parts by measure of cooked whole oats, whole barley and whole shelled corn with an equal part of bran and silage mixed thoroughly with the cooked grains, makes a very satisfactory mixture. This particular ration has proven very palatable and the steers will consume large quantities during the winter months. It is at this stage of the feeding program that I like to put on about three pounds per steer per day, because steers can be successfully "pushed" to a greater extent in cold weather than during the warm summer months. By following this procedure, steers will lose their winter hair early and bloom out in a fresh appearing coat of short hair in the spring.

Cooked feeds may be fed until

the first of May when the ration should be reduced somewhat. A steer should be weaned from its nurse cow when from ten to twelve months of age, at which time it should be sufficiently well grown and fat to be carried through the second summer of feeding without difficulty. As mentioned previously, I prefer to fatten my steers during the winter months and coast them through in the summer in order to maintain the smooth firm covering of flesh that is desired. It is frequently advisable to place a steer alone during the summer months in order that he may be fed with every degree of caution. During this period I feed a ration composed of equal parts by measure of crimped barley, crimped oats and bran with pea-sized linseed meal. A protein concentrate should be fed in accordance with the individual's needs, which frequently varies considerably among steers.

I feed four times each day with the exception of Sunday when the noon meal is omitted and a liberal feed of good legume hay or dessert, as I like to call it, is given. Fresh, clean water is kept before the steers at all times.

The steers receive very little grain at the morning feeding at 6 A.M., but the grain is gradually increased at each succeeding meal. At 8 P.M., when I turn the steers into the lots for the night, a small portion of grain is fed so that they will be given a chance to fill up and rest better on a full stomach. During warm days frequently they eat less.

The barn is kept darkened by hanging burlap over the windows. The air is allowed to circulate through the open windows and the doors are kept open to assist in ventilating the barn.

It is well to blanket the steers in order to keep the hide and hair clean. This procedure is also a protective measure against flies. When blankets are used there is no occasion to apply fly repellant which is often harmful to the hair and hide. The steers should be washed and dipped several times during the summer in order to keep the hide clean, and promote the growth of long, thick hair for the winter shows.

After the steers have been turned into their night quarters and have eaten, it is a good practice to halter each one and give a short lead. The exercise is essential and the animals will become accustomed to the show halter and show stick. Stop each steer several times in the process of training and set him up properly on his legs. Many shows are won or lost by the behavior of the steer when he is being handled by the judge. In training we strive for good behavior from the beginning, and it pays dividends in the show ring.

About the first of October, when I still have sixty days of feeding before the International, I begin to use cooked feeds again. At this time a ration of equal parts by measure of shelled corn, whole wheat, whole barley and whole oats is used. These grains are cooked together and when taken from the cooker they are mixed with a small amount of bran and silage with three pounds of linseed meal per head being added each day. I turn the big steers together under an open shed and feed all of this mixture that they will clean up readily. I also begin spraying the steers well each evening with cold water and dip. This encourages the growth of the hair.

As a rule, the twenty months old steer will have had four foot trimmings. It is best to trim the feet about three weeks before showing in order to avoid lameness in the show ring.

The steers that are being fed for the younger classes are handled in much the same manner in the beginning as the steers that were mentioned in the first part of this discussion. We must get these calves fat as early in life as possible in order to meet the modern demand of the judge, packer and consumer.

In my experience there has been nothing that can take the place of milk in getting the calf fat and bloomy. Just as soon as the baby calf shows the need for additional milk he must have it along with a good strong ration of equal parts of coarsely cracked corn, crimped barley, crimped oats and bran. This feed is moistened with a small amount of beet pulp and blackstrap molasses and fed four times each day. I feed light in the morning and add more of the mixture at later feeds. It is well to feed two steers in each stall, as the smaller animals will eat more grain when they have a stall mate. I feed all steers together at night and give them as much feed as they will clean up in a half hour.

If you have a calf that looks like he might get the job done, it will help to give him a fresh Holstein cow about every sixty days, as a calf will consume more milk when allowed to nurse a fresh cow. I have had several steers make very large gains by this method.

I feed hay very sparingly to my younger steers, as a large amount of milk has a tendency to make them wasty in the middle. Furthermore, it is impossible to get an animal fat on hay and if it fills up on roughages there is little room for milk and grain.

Calves should be weaned a reasonable length of time before they are shipped to Chicago so that they will have sufficient time to become accustomed to grain and roughage and thus have over-

come the effects of weaning. The ration should be reduced considerably about two days before shipping. Eliminating the salt and linseed meal from the ration and feeding much more hay than before, aids materially. While on the train enroute to the show, we keep timothy or prairie hay before the cattle at all times and feed a small quantity of grain twice daily. Water is supplied twice daily also. After unloading the cattle it is a good practice to allow them to rest in their stalls for a day before washing is begun. We usually wash the second day after arrival, then curl the cattle and brush until they are dry. The cattle should be washed again about six hours before showing. An animal well fitted and in bloom looks his very best after he has been washed and brushed dry.

A spray should be used in applying oil and the latter worked well into the hair. Comb the hair until it is standing straight out from the body and is fluffy but not curly. Have the switch of the tail picked out, all the straw off the belly, the show halter adjusted properly, your show stick in hand, and a stiff bristle brush and a rubber comb in your pocket. The rest is up to you to do the best job possible with the steer you have in hand to show. We have worked long hours for this show and we cannot afford to let down at the critical moment.

Patching Thin Alfalfa

Because of the rather long life and gradual thinning out of alfalfa, the question of whether thin alfalfa can be reseeded with alfalfa is a common one. Trials at the Ohio Agricultural Experiment Station answer the question.

Attempts to reseed alfalfa in old, thin alfalfa have uniformly failed, although such seedings have been made repeatedly under favorable conditions. Old alfalfa plants, even when there are only a few per square yard, make such a shade that alfalfa seedlings are smothered and cannot establish themselves.

Ohio agronomists have found, however, that it is possible to seed timothy in old, thin alfalfa and so prolong the usefulness of the meadow. Make the seeding after the final cutting of alfalfa is removed. This period is favorable for starting timothy, and alfalfa usually does not make such a growth as to kill it.

—*Cappers Farmer*

Easy Sewage Disposal for the Modern Farm

Condensed from Successful Farming

Charles Dart

WHEN a farmer thinks of modernizing his home with running water he is immediately confronted with the question of sewage disposal. An easy and simple answer is the septic tank. In fact, it's very nearly the *only* answer.

A septic-tank system is composed of three parts—the inlet system which transports the sewage to the tank, the septic tank itself, and the outlet system which distributes the effluent from the tank into the filter bed. Treatment of the sewage is accomplished at two points: first, in the tank, and, second, in the soil of the filter bed.

In the septic tank the sewage is acted upon by anaerobic bacteria—bacteria which die when exposed to air. These unseen workers are present in the sewage, and all they need is a chance to work; they convert the animal and vegetable matter into liquids and gases, and the mineral matter settles to the bottom of the tank in the form of a sludge. (This sludge, which will in time clog the system, must be removed every five years or so.) On the top of the sewage a thick scum forms; this excludes the air and thereby provides a favorable environment in which the anaerobic bacteria may live and multiply.

Some extra precautions should be taken to preserve the lives of these bacteria. Disturbance of the scum and consequent entrance of air must be avoided, so either baffles to quiet the sewage should be constructed within the tank, or the sewage should enter and be discharged at points considerably below the scum formation. In addition, quantities of strong disinfectants should not enter the tank too frequently, since this also would kill the bacteria. In general, common use of house hold disinfectants will not be injurious.

Now, the second treatment of the sewage, and the more important as far as purification is concerned, occurs in the soil of the filter bed. Here the liquid discharge from the tank seeps into the soil and is acted upon by aerobic bacteria—bacteria which live in the presence of air. The filter bed must be located close to the surface of the ground because the bacteria which act upon the sewage to render it harmless are

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present in sufficient numbers only in the upper layers of the soil.

There are a number of commercial septic tanks on the market which, if properly installed, will give satisfactory service. Be careful, though, about getting a tank too small. For effective treatment, sewage must be retained in the tank at least 24 hours, and a longer period is preferable. Experience shows that in homes having running water, each person in the family uses 35 to 50 gallons of water per day. However, septic tanks having a capacity of 70 gallons or more per person are the most practical. Tanks smaller than this require a grease trap for successful operation, and most users like to avoid the disagreeable task of frequently cleaning such a trap.

Locating the septic tank demands a little thought. It may be close to the house—just far enough away to permit handy construction of the tank and installation of the inlet tile; a distance of at least 10 feet is recommended. The simplest installation calls for a separate drain for the basement floor. *The septic tank should not be closer than 100 feet to a well supplying drinking water. If this is impossible, special care must be taken to insure that the tank is watertight.*

A septic tank should be covered with about 12 to 18 inches of earth, which will readily permit the growth of vegetation. No frost damage will be experienced at this level because the bacterial action in the tank liberates sufficient heat to prevent freezing, even in the coldest winter weather.

In the construction of a sewage-disposal system, it is generally simplest to construct the tank first and lay the inlet and outlet tile afterward. The inlet sewer may be of cast-iron pipe with leaded joints or of bell-and-spigot tile with tightly cemented joints; in either case the tile should be placed with the bell end up the slope. Swab out the inside of each joint to remove any particles of cement or other material which might obstruct the flow. For a four-inch sewer (and this is adequate for a system serving one bathroom) the grade should have about one inch of fall for every eight feet of run.

The outlet or distribution system is essentially a seepage drain which permits the liquid discharge from the tank to seep away into the ground.

Outlet tile (four-inch tile is generally considered sufficient) should be laid with the joints open about one-eighth inch to one-fourth inch, and about 12 to 15 inches below the surface of the ground — just deep enough to allow the land over them to be plowed if desired. Place pieces

of tar paper over the upper portions of the joints to prevent the entrance of earth after the tiles are covered. A slope of not much more than one inch of fall in 25 feet of run is best for the outlet tile.

The length of outlet tile line used varies with the ability of the soil to absorb moisture. In sandy soils 30 feet of tile per person should be satisfactory; 100 feet of tile per person may be required in tight, impervious clay soils. If the ground above the tile line becomes soft and soggy, the outlet system should be lengthened. Usually a single tile line is sufficient; however some installations make use of a concrete distribution box — a sump from which two or more lateral seep drains extend. Stop boards may be inserted at the ends of these laterals within the box to direct the liquid into the separate tile systems. This provides a resting period for each drain which restores more favorable conditions for bacterial action.

The location of the outlet tile does not necessarily have to follow a regular pattern. Length and slope of the seepage system are the important factors. Sewer pipe with tightly cemented joints should be used in the vicinity of trees and shrubbery because roots are likely to penetrate the tile lines and cause stoppages.

Once you have the tank and pipes in, you won't have anything more to worry about. Some have given as much as 25 years of service with no attention whatever. In any case, you can be sure that a well-installed tank will last a good long while as a necessary partner to that new water system.

When Handles Get Slick

An empty tobacco sack containing some powdered rosin comes in handy around a workshop or in a car. When tool handles become slick and hard to hold, rub the little sack of rosin over them. Enough of the powder comes through to make the handles easy to hold to. The steering wheel of a car also becomes slick, and this can be fixed easily with the rosin bag.—Mrs. Cleve Butler

—*Kansas Farmer*

Raising Calves When Milk is Scarce

Condensed from Guernsey Breeders' Journal

Paul H. Phillips and George M. Werner
University of Wisconsin, Madison

IF necessary, good calves can be raised when milk is scarce. Calves, like other animals, to be thrifty and to grow normally need plenty of food energy, the proper amount of protein, balanced minerals, and enough of the right vitamins.

The new-born 100 pound calf needs about a gallon of milk a day. About a gallon is required to furnish the necessary B vitamins. At least a quart is needed to furnish vitamin A to prevent calf scours and pneumonia. Milk, fed to calves, should be measured rather accurately.

Because colostrum milk—that given by the cow at freshening—is extremely rich in vitamin A and certain of the B vitamins the new-born calf should be given, during the first few days, all of this milk it will take. Excess colostrum milk, from cows freshening in the herd, should be used with the milk fed to other calves already past colostrum feeding. Given in moderation it is good food for the calf regardless of its age. If too much colostrum is fed it may tend to produce scours.

Sun-cured hay of good quality will usually take care of the vitamin D requirements of the calf. If, however, stiffness or swollen joints develop, then extra vitamin D must be fed. It is easily furnished by feeding in the grain mixture cod liver oil or irradiated yeast. Cod liver oil is used at the rate of one pound to ninety-nine pounds of the grain mixture. Yeast is used at the rate of one-tenth of a pound to about 100 pounds of the grain mixture.

A good ration should be fed as early as it is possible to get the calf to eat it. Because a calf will eat very little else during its first two weeks it should be furnished milk in rather liberal amounts, say from four to five quarts a day. Although the calf will begin to nibble at a grain mix or at hay during the second or third week, it cannot handle much bulky feed until it is from six to eight weeks old. Its paunch does not begin to function until then.

During this early period it takes a little time to get the calf accustomed to a grain ration. It can be made to take heavier feed-

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ings of grain—from one-quarter to three-quarters of a pound by letting it go hungry or by feeding it a thin, warm gruel. If it is gruel fed, feed three-fourths of a pound of grain mix, finely ground, and stir it into three-fourths of a gallon of warm water for every gallon of milk displaced. If the calf does not take to the gruel readily, mix in a small amount of milk. Do not give water shortly before or soon after the gruel. Gruel feeding is an excellent method of getting the calf on grain early and of avoiding losses in weight which might happen during the transfer from heavy milk feeding to reasonable grain feeding. Care must be taken when feeding gruel to prevent over feeding—causing a loss of all gains made.

It is always good calf management to keep the calf eager for its feed. It should not be stuffed. Reduce its feed sharply for a feeding or two if signs of "logginess" appear. This is usually sufficient to keep it "up and coming."

Dairymen may choose whichever of the following rations is most convenient or best suited to the needs of their herds. The first two have been worked out and used effectively at the University of Wisconsin.

Older calves need less protein than young calves and Wisconsin ration 3 can be modified easily by omitting the fish meal. This should be done when the calves are about four months old. If good quality green hay is being fed, the ground alfalfa can likewise be left out at this time. Should good hay not be available then the inclusion of from five to ten per cent ground alfalfa is advisable since this is the principal carrier of the parent substance of vitamin A, carotene.

The inclusion of blackstrap molasses in the ration after the calves are older is a matter of choice. Its use will improve appetite with the result that more growth is obtained, but it may not warrant the additional cost and bother necessary to mix it into the ration.

These Substitutions May Be Made

Rations Wisconsin 3 or 5 may be shifted without great loss of the feed values. For example, linseed oil meal may be used to replace part or all of the soybean meal indicated. Its use depends upon its cost. Many feeders like to use linseed oil meal in their calf ration and where the price is favorable this can be done to good advantage. A fifty-fifty soybean meal and linseed oil meal mixture may be used. However, ration 3 is adequately fortified and the adding of linseed oil meal to it is not necessary.

In some sections, blackstrap molasses may be difficult to obtain as this product may be di-

CALF RATIONS

	Wisconsin 3 pounds	Wisconsin 5 pounds	New York pounds	New Jersey pounds
Ground yellow corn	30	30	32.25	25.0
Ground oats	30	30	28.00	27.5
Soybean oil meal	14	14	....	...
Fish meal	3	..	3.00	...
Wheat bran	8	8	10.00	12.5
Blackstrap molasses	7	7	....	...
Alfalfa hay (ground)	6	6	....	...
Bone meal	1	1	.50	1.0
Iodized salt	1	1	.50	1.0
Linseed oil meal	..	..	5.00	12.5
Yeast (brewers or bakers)	..	..	5.00	...
Soluble blood flour	..	..	....	12.5
Dried skim-milk	..	3	10.00	...
Limestone	..	..	.50	1.0
	100	100	100	100

verted into other channels. Molasses is rich in certain members of the vitamin B complex as well as being highly palatable. It is to be recommended and included if it can be obtained and mixed in the ration. If not, then the alfalfa hay should be increased from six to ten per cent in ration Wisconsin 3.

Fish meal is used in this ration to support the soybean oil meal. Its use is essential if good growthy calves are desired. Dried skimmed milk will replace the fish meal and where the price is favorable it is to be preferred. It should be fed at the rate of five to ten pounds in Wisconsin No. 3 ration. Other protein feeds may be used for the replacement of part of the soybean oil meal. Gluten meal or cottonseed oil meal may be used for this purpose when the price tag warrants.

After the second week it will pay to keep hay before the calves at all times. The calves should be supplied with plenty of fresh water. Start feeding them silage in small amounts from one to two pounds a day at nine to ten weeks of age, but be sure to feed only very good silage. Continue grain feeding at the rate of four pounds a day until the calves are six months of age or even older if desired.

Watch the calves closely. Some will eat grains readily while others will be difficult to start on grain. Those which eat grain readily can be cut down rapidly on milk. Keep in mind that normally a four weeks old calf needs at least two gallons of milk a

day whereas when milk is scarce it is given but one gallon and an equal amount of energy from the pound of grain mixture. While this schedule is light on milk for large Holstein and Brown Swiss calves it is about right—considering the calf requirements for energy, vitamins A and B complex and minerals—for the Ayrshire, Jersey and Guernsey breeds.

This milk feeding schedule was outlined to use with the New York ration. Wisconsin rations 3 or 5 may also be used with this schedule. The calves should be fed as much of the grain mixture as they will eat. In addition, they should have clean, leafy mixed hay before them at all times.

Schedule of Milk Feeding Advocated by Cornell University

	Pounds of Whole Milk Fed Daily	
	Holstein	Guernsey
Calf left with cow first day	..	..
2nd to 7th day, not to exceed	8	5
2nd week, not to exceed	9	6
3rd week	10	7
4th week	9	7
5th week	7	6
6th week	6	6
7th week	4	5
8th week	..	4
9th week	..	3
10th week	..	3

Paraffin Keeps Paint

Melted paraffin poured over the top of a can of paint will prevent it from hardening. When can of paint is again needed, the paraffin is easily lifted.—A. C. S.

—*Kansas Farmer*

What Do They Mean?

Condensed from American Poultry Journal

U. S. Certified Chicks, in addition to the approved requirements, are produced by flocks mated to R.O.P. males whose R.O.P. dams must have yearly records of 200 or more eggs. Hatching eggs must weigh 24 oz. per dozen.

U. S. Verified Chicks come from approved females and R.O.P. males from flock matings of R.O.P. males and females.

R.O.P. is an abbreviation for Record of Performance to qualify for which a female must lay at least 200 eggs averaging 24 oz. per dozen in 365 days and must be free from Standard disqualifications. A male must be pedigreed from a mating composed of R.O.P. females and one R.O.P. male. His dam must have laid at least 225 eggs in 365 days. R.O.P. records are made on home farms under state supervision.

R.O.M., Register of Merit, is a certificate awarded to the progeny of any R.O.P. individual. An R.O.M. female is one out of an R.O.P. or R.O.M. mating who qualifies one-third of her daughters with a minimum of 4 for R.O.P. ratings. An R.O.M. male with similar matings when mated to an R.O.P. or R.O.M. female must have one-third of his daughters, minimum of 20, qualify for R.O.P.

U. S. Approved Chicks come from state inspected breeding flocks under the National Poultry Improvement Plan. These flocks must be true to the type and conformation of the breed and must produce hatching eggs that weigh at least 1-11/12 oz. each.

Sexed Chicks are chicks that have been separated at hatching time into two groups, males and females, by an examination of the sex organs.

Assorted Chicks are a mixture of heavy and light chicks of all breeds.

Light Assorted is the term applied to chicks of the light breeds such as Anconas and Leghorns and may mean a mixture of these breeds or merely off-color chicks of one breed.

Heavy Assorted Chicks include such breeds as Reds, Rocks, and Wyandottes and may include off-color chicks.

Straight Run Chicks represent chicks of either light or heavy breeds and sold as they are hatched without sex separation.

Started Chicks have been held and fed at the hatchery for a period of time after date of hatching.

Reprinted by permission from the American Poultry Journal, Chicago, Illinois

Pedigreed Chicks are chicks of which the exact parents and the records of the female ancestors are known for at least two generations.

Pullorum Tested Chicks, often referred to as bloodtested or B.W.D. Tested, are chicks produced from breeding stock that has been tested for bacillary white diarrhea and found to be free of the disease.

Breed is the term used to define a specifically shaped group of birds that have a recognizable type such as Plymouth Rock, Wyandotte, Leghorn, etc.

Sex-linked Chicks are the result of a mating in which a characteristic of the female line is transmitted to the male chicks only so sexes can be determined at hatching time, that is, Barred Rock female x Red male equals barred cockerels and combination color pullet chicks.

Cross Bred Chicks result from the mating of individuals from two distinct varieties, breeds, or classes.

Hybrid Chicks are commonly referred to as the result of a cross involving sex-linked characters whereby the male chicks inherit certain characteristics such as color, feather pattern, or rate of feathering from the mother, which makes possible easy separation from the pullet chicks.

Hybrid Vigor is usually present in the offspring of a mating between individuals of different breeds or classes and is probably caused by a doubling up of the growth factors of the mates so that greater growth and vigor is apparent.

Variety is a subdivision of a breed into kind of comb, plumage color, or color pattern.

Strain means family or line that has been developed in any breed or variety.

Crate Catches Chickens

Easiest and quickest way to catch chickens is to place a crate outside the poultry house and against a small door. The fowls are driven thru this door into the crate.—Mrs. Ocie Chilton

—*Kansas Farmer*

Rubber from the Desert

Condensed from The Reclamation Era

A. B. West

Economic Analyst

GUAYULE is a rubber-bearing plant indigenous to southwest Texas and northern Mexico. Before the advent of tire rationing last December it was an almost totally foreign word to the average citizen. Today that citizen is learning that war needs and retread stock for his own tire, if he is eligible, may have to come in part at least from domestic production of this unimpressive looking shrub.

The country's need for rubber to keep war wheels moving and civilian life functioning is estimated at 800,000 long tons a year. Present stocks are placed at 600,000 long tons. Imports now are a question mark, and we face the unhappy prospect of losing completely our main supply of crude plantation tree rubber. In the meantime our needs can be met scantily for the next 3 years by conservation of imported crude, greater use of reclaimed rubber, and increased production of synthetic rubber. But there is an end to this. Our reservoir of reclaimed rubber will become exhausted, our imported crude will melt away under the demands of the expanding war industries, and synthetic rubber alone does not make good tires or good tank treads.

Some source of natural crude must be found. Guayule offers the brightest hope. Together with what tree rubber can be gotten from South America and Africa, it can be made to meet the emergency.

Guayule has been used for producing rubber commercially on a small scale since the early 1900's. In 1912 it was brought to the Salinas Valley in Monterey County, California, by the American Producer's Division of the Inter-Continental Rubber Co., and experimental work was begun in building up a highly productive strain from the desert varieties.

The cultivation of guayule as a domesticated plant has not been accomplished easily. By painstaking effort the stunted, slow growing wild shrub requiring 15 to 20 years to reach a size economical for marketing has been evolved

Reprinted by permission from The Reclamation Era, Washington, D. C., March, 1942

into a plant capable of withstanding close cultivation under forced growth, and yielding about 1,250 pounds of rubber per acre in 4 years' time.

The accompanying table compiled by the Inter-Continental Rubber Co. is based on its experience at its Salinas, Calif., experiment station. It estimates the acreage required to yield 10,000 tons of the dry shrub annually for each year of a projected 10-year period. It should be noted that the cost per pound stabilizes at 11.3 cents the seventh year, but that reasonably efficent production is reached the fourth year. The yield per acre starts at 90 pounds the first year, almost quadruples the second, and by successive increments reaches 3,195 pounds the tenth year.

The Salinas growers have developed a very efficient routine of planting and harvesting guayule, much of which is accomplished by specially designed machinery. The seeds are presprouted and planted in nursery beds supplied with overhead irrigation. Planting is done entirely by a machine which automatically spreads the seed, rolls the seed bed, and covers it with a thin layer of sand. Frequent irrigations nurse the tender plants along, and in 10 to 12 months the seedlings are dug out by a power drawn cutter blade, sorted, and transplanted to the field, 5,000 in a box. Here they are placed in a planter and transplanted six rows at a time. No irrigation is required in field culture of guayule in the Salinas valley, due to cool, wet winters and summer fogs.

In the Southwest and in the interior of California, irrigation would be required the first year, and probably the second, third, and fourth, though in lesser amounts. The first year water duty is slightly less than required for cotton. Water must be completely cut off in the hot weather after the first year, or the plant grows in stature instead of accumulating rubber in the roots and branches of the first year's growth, about 20 inches in height. Mature plants rarely exceed 30 inches. Seed is produced prolifically when water is supplied, but reduced in amount when the plants are deprived of water to hasten the formation of rubber.

The plants are harvested by plowing up the rows two at a time and throwing them together in a windrow. These small windrows are combined to larger ones, and picked up by a machine which chops the plants and loads them on a truck. The chopped mass is put through a mill that macerates it, and the rubber is skimmed off through a flotation process.

The rubber at this stage contains from 16 to 20 percent resin

and must be treated to remove it. The deresinated rubber compares very favorably with imported crude from the Far East. Although the cost of deresinating is estimated to amount to $60 a short ton, it is largely repaid in the value of the resin by-product.

Tire manufacturers have used deresinated guayule rubber for many years, purchased in Mexico and from the Salinas growers. If production costs could be lowered to permit economic competition with plantation rubber in normal times it could be used exclusively.

It is probable that guayule will be harvested after 4 year's growth in the field, and that to make a realistic contribution as crude rubber to be mixed with synthetic at least 2,000,000 acres will be required. This acreage, harvested at the rate of 500,000 acres annually would yield approximately 285,000 long tons a year.

It is estimated that not over 100,000 acres of suitable unirrigated land can be obtained along the coastal valleys of California, and that the remainder of the land needed under a 2,000,000-acre guayule program would have to be irrigated. Little hope is held for inland unirrigated plantings, for although the guayule shrub grows wild under semiarid and arid conditions that seem to resemble a great area of the West, it cannot compete in hardiness with sagebrush, greasewood, and other desert plants. It is very selective in its choice of native habitat, growing best on slopes of rocky ridges where the soil is leached and composed chiefly of deteriorating limestone.

The Department of Agriculture is expected to receive congressional sanction to undertake a rubber plant program to "make available a domestic source of crude rubber for emergency and defense uses." An initial planting of all available seed will be made in nursery beds as rapidly as facilities can be expanded. Although the present law restricts plantings to 75,000 acres, that acreage represents more of a goal than a restriction. Field plantings of 2,000 acres will be made this spring from nursery seedlings on hand, and the acreage expanded as rapidly as possible.

To promote the most rapid expansion in acreage and obtain an estimated yield of 43,000 long tons of crude guayule rubber by the end of 1946, the 75,000 acres now authorized must be planted in field culture in the spring of 1943. Thereafter annual field plants of 500,000 acres, on irrigated land, must be made if 285,000 long tons of guayule rubber are to be ready for the factories in 1947 and each year thereafter.

Among the factors that must be taken into account under a 4-year plan of culture are: Ample water the first year, and sufficient water as needed during the ensuing 3 years; hot, dry summers that will permit growth functions to become dormant, hastening the deposition of rubber in roots and branches; minimum winter temperature of not less than 20° F.; and availability of public lands or leaseholds on private land.

Guayule rubber production data based on experience of the Intercontinental Rubber Co., Salinas, Calif., using an extraction unit of 10,000 tons of dry shrub per year

	Field age of harvested shrubs, in years									
	1	2	3	4	5	6	7	8	9	10
Dry shrub harvested per acre, short tons	0.75	1.78	2.87	3.82	4.68	5.43	6.12	6.79	7.40	7.99
Required to yield 10,000 tons of shrub in 1 year, acres	13,333	5,618	3,484	2,618	2,137	1,842	1,634	1,473	1,351	1,251
Required for crop cycle, acres	13,333	11,236	10,452	10,472	10,685	11,052	11,438	11,784	12,159	12,512
Dry rubber extracted, percentage of shrub weight	6	9	13	16½	18	19¼	20	20	20	20
Annual production of dry rubber, short tons	600	900	1,300	1,650	1,800	1,925	2,000	2,000	2,000	2,000
Yield per acre, of dry rubber, pounds	90	320	746	1,260	1,825	2,090	2,448	2,715	2,960	3,195
Cost per pound of rubber, cents	81.6	35.2	20.2	14.5	12.9	11.8	11.3	11.3	11.3	11.3

The foregoing costs assume continuing operation of land and reasonable weed control. The excess cost (if any) of initial weed control for badly infested land is not included.

	Short Tons
If 1 acre of guayule shrub were set out each year for 10 years, without harvesting, then at the end of 10 years the rubber reserve in the 10 acres of living shrub available for extraction would be 17,500 pounds or	8.75
If 10,000 acres were set out, the rubber reserve would be	87,500
And if 100,000 acres were set out, the rubber reserve would be	875,000

Source: Hearing before the Committee on Agriculture, House of Representatives, Seventy-seventh Congress, second session, on H. R. 6299, a bill "To provide for the planting of 75,000 acres of guayule or other rubber-bearing plants in order to make available a domestic source of crude rubber for emergency and defense uses," page 22.

Seed Treatments Benefit Growth of Cereals and Corn

Condensed from Farm Research

Willard Crosier

STRIKING results are often obtained when treated and untreated vegetable seeds are planted on fungous-infested soil. While seed treatments of cereals and corn may not produce such noticeable increases, the results are usually gratifying. On the average a grower will profit from consistent annual chemical treatment of these common agricultural seeds.

Several chemicals doubled the yield from smutty wheat seed this past season. The cost for this treatment amounted to only 5 cents per acre in comparison to 55 cents per acre for pea seeds. Experiments conducted over a period of several years on the Station farm have always yielded significant increases from treated seed. This year in particular control of smut paid big dividends. Oats can be treated at a cost of only 2 cents per acre to give complete control of all smut diseases. The yield may increase 10, 20, or even 100 per cent, depending upon the severity of the diseases.

Seed treatment of corn is very inexpensive, the cost varying from ¾ cent an acre for sweet corn to 1½ cents an acre for ensilage corn. Increases of 5 to 10 per cent are common for sweet corn and if a No. 2 grade of seed is used the increase from treatment may amount to 20 or even 30 per cent. Field corn seed is less apt to decay in the soil than is sweet corn seed, so chemical protection of the former may produce no increase in yield or only around a 5 per cent increase.

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Feeding the Mature Herd Sire

Condensed from Holstein-Friesian World

ALL feeding of livestock is with a definite purpose. The dairy herd is fed for the most economical production. Calves are fed to make the best and most economical growth and development. Fat stock is fed to make the most rapid and economical gain in weight. The objective in feeding the mature herd sire is to keep him in top breeding condition, and proper feeding is one of the most important factors in meeting this objective. The fat, paunchy, big-bellied bull is usually a slow breeder, if only because of the physical difficulty of mounting the cow; and the bull's fertility is also greatly affected by the feed in his diet.

Proper feeding of the aged bull requires good feeding judgment. The aged sire should be kept in good sleek condition, but hard and tough—no paunchiness, not too much fat, sound feet and legs. Every expert stresses the importance of watching the bull's condition from day to day, cutting down on roughage when a tendency toward paunchiness appears, and feeding a ration concentrated enough and in amounts sufficient only to maintain medium body condition.

Most of our experts feed a balanced ration of around 16% protein, the same feed that the milking cows are given. At Laurmont the ration is based upon crushed oats, with bran, oil meal, corn meal and salt, with a scoop of soaked beet pulp added to increase palatibility. At Pabst Farms the grain mixture contains soybean oil meal, bran, ground oats, ground barley and ground corn. At Winterthur they feed a bull ration about one-third oats and the balance bran, hominy, oilmeal, ground alfalfa and molasses. All feed quite liberally so long as the old fellow does not get fat.

Most of the members of our Advisory Committee avoid feeding silage because they believe it has a tendency to make the bull slow and uncertain in breeding. Howard Clapp of Pabst Farm is a dissenter from this majority opinion, stating that there are no feeds which they particularly avoid as long as the quality is good. John Last, of Milford Meadows Stock Farm, feeds corn silage up to about 15 pounds a day, and Herb Miller of Ionia State Hospital, feeds a "limited amount." Wm. E. Reed

Reprinted from the Holstein-Friesian World, Laconia, N. Y., March 14, 1942

of Winterthur Farms says that they never feed it, but admits that he doesn't know why; while the others feel definitely that silage actually slows down the breeding bull.

Another don't, this one unanimous, is NO ALFALFA HAY. Use a mixed hay, say timothy and clover of good quality. Bright leafy, green-colored hay contains more of the vitamins and minerals that help to maintain a bull's fertility. It is poor practice to feed the bull hay that the cows have left, both from the fertility and the disease-spreading standpoints. The amount of hay fed to the bull should be limited with an eye to the critter's middle, which mustn't grow too deep. To stop that paunchiness, cut down on the hay and give him a little more grain.

Pasture is the favorite bull feed of several of our experts. John Last of Milford Meadows says, "There is no feed that will keep a bull in as good breeding condition as allowing him to graze on good pasture. By means of an electric fence a two acre lot can be easily fenced and the bull can be controlled without any difficulty. He will need no other feed while the pasture is good." Mr. Last kept one valuable old proven sire in active breeding condition by this method until well past the venerable age of 15. Vere Culver of Port Deposit, Md., is another pasture-for-bulls believer. He says that "no feed can excel good pasture for aged herd sires." Several other experts recommended the feeding of green grass in season when pastures are not available.

Mature bulls need plenty of fresh clean water. The suggestion is made, however, that if possible, the amount of drinking water should be controlled, and watering should be done AFTER the day's breeding is over, to avoid slow-downs in the breeding chute due to a water-filled paunch.

Minerals and vitamins, particularly Vitamin E, have an effect on fertility, and should be supplied in the ration. Several members of our committee advised the feeding of wheat germ oil with the grain ration several times during the year, or at any time when the sire is in particularly heavy service. One recommended feeding sprouted oats during the winter months, and another has a commercial mineral-vitamin supplement as a part of the regular grain ration. Wm. Reed of Winterthur Farms, on the other hand, reported no noticeable results from feeding either grain sprouts or feeding or injecting wheat germ oil. The New Jersey Station confirms this view of sprouted oats, based on their records in artificial breeding associations.

Mr. Culver made one especial-

ly interesting statement in his answers to our bull-feeding questions, as follows: "With two nationally famous bulls of two different breeds that had severe crampiness and rheumatism, I have known their trouble to be cleared through the feeding of about 8 pounds of dried molasses citrus pulp."

To sum it all up: Always feed your bull with an eye to his physical fitness. Keep him tough and hard, in medium flesh, and keep down that middle. Feed green grass, either as pasture or silage, whenever it is available. Feed only top quality hay, avoiding alfalfa. Stay away from silage. Give your bull plenty of clean fresh water, preferably after his day's work is done.

Provide the old bull with room for exercise, keep him reasonably clean, feed him wisely—and you can expect to keep him in active service to a ripe old age.

Experiments in Tenderizing Beef

As a result of government tests, it has been found that aging a thick beefsteak for 35 days at a temperature just above freezing makes it more tender. The steak will be equally tender if it is ripened for only five days and then frozen at minus 10 degrees Fahrenheit. The steak aged for 35 days will be even more tender if it is then frozen at minus 10 degrees Fahrenheit. When frozen at the higher temperature of 20 degrees Fahrenheit, after aging for 25 to 35 days, steaks were almost as tender as those frozen at 10 degrees Fahrenheit.

However, the longer the ripening period, the greater the chance of spoilage organisms affecting the quality of the meat. The Department results suggest the use of the combination of aging not to exceed 15 days at 34 degrees Fahrenheit, followed by freezing at minus 10 degrees Fahrenheit for beef cut about 1.5 inches thick. Freezer locker patrons do not always have access to temperatures below zero. But to improve tenderness they can first age their beef at about 34 degrees Fahrenheit, and then freeze it at the lowest available temperature. The meat should then be wrapped in moisture-vapor-proof paper for storing.

—Rural New-Yorker

Finding Substitutes

Condensed from New England Homestead

Dr. Raymond T. Parkhurst

WAR in the Pacific has made a bad situation worse and no one can predict now what the fish oil situation will be in the future. Undoubtedly the fishing trawlers off the Pacific Coast will be called upon to do work more directly associated with the war than the catching of sardines, sharks or tuna fish. Even previous to the declaration of war by Japan, the importation of tuna livers and tuna liver oils for fortifying fish oils was drastically curtailed. During the past year, cod liver oil for poultry feeding has practically disappeared from the market even as a carrier for fortifying agents and there have not been sufficient amounts even for the drug trade. Although small shipments of fish and liver oils are being received from other countries, it will be necessary for some time to depend almost entirely upon domestic sources of vitamins A and D.

Many feed manufacturers have changed gradually from fortified cod liver oils to fortified sardine oils and fortified "feeding oils" during the past year as their supplies of fortified cod liver oil have been consumed. Both natural and fortified sardine oil may follow fortified cod liver oil off the market, except for contracted supplies, unless the fishing situation on the Pacific Coast is clarified soon. Vitamin A and D feeding oils of various potencies have been available for over a year and those purchased from reliable sources are proving satisfactory.

Fortunately, research workers have discovered and developed a quantity production of "D"—activated animal sterol using domestic sources of sterols. Many processors of fortified oils are now using this new source of vitamin D to fortify carrier oils. Vitamin D in a dry or powdered form obtained by mixing the active material into a cereal flour, dried skim-milk or a mixture of these ingredients is on the market now and is being used by some manufacturers either to replace or supplement the fish oil concentrates such as Skipjack liver oil. Actually the cost of vitamin D is only slightly more than a year ago and there is no shortage of materials for manufacturing vitamin D products. Some increase in all vitamin products can

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be expected if costs of materials, labor and taxes increase as they have been doing.

Poultrymen are more vitamin conscious than they ever have been and are certain to become more so with so much emphasis being placed on the importance of vitamins in human nutrition by the national health program. Extreme deficiencies of vitamins in poultry are easily observed. The most difficult diagnoses to make, even for experienced observers, are the partial deficiencies of these vitamins. It has been quite definitely established that a partial deficiency of either vitamin A or vitamin D may result in the retardation of growth and development, wasting away from no apparent cause, ruffed feathers and lower vitality, more lung troubles, loss of appetite, lower egg production and poor hatchability. Most of these symptoms may also develop from other causes such as inherited poor vitality, lack of other nutritional factors or poor management. Therefore, the pathologists look for one or more specific symptoms of vitamin D such as beaded ribs, enlarged parathyroid glands, swollen joints, soft leg bones and beaks, crooked breastbones, low calcium and phosphorus in the blood and low bone ash. The specific indications of vitamin A deficiency would include, in addition to the nutritional roup, the presence of pustules in the gullet, the kidneys enlarged and pale or gray, the gall bladder enlarged and the ureters filled with urates. Embryos from hens getting a vitamin A deficiency may show, after the eighteenth day, more malpositions in which the beak is over the right wing. The poultryman and the feed mixer has plenty of reasons for making certain there is an adequate amount of the vitamin A and D in the ration.

Mention has already been made of the ample supply of vitamin D for fortifying fish oils, cereals and dried milk. If there should be such a demand on the sources of this form of vitamin D that a temporary shortage resulted, it might require four months to arrange the necessary facilities for increased production. If the price of vitamin D increases materially more careful consideration will need to be given to the use of sun lamps for poultry. No further data have come to the writer's attention to change the opinion expressed a year ago in these columns to the effect that not many poultrymen are going to change from a mash with vitamin D in it to one without it and use a sun lamp unless the evidence that they should is more convincing than it is at the present time. It would help greatly if we knew the optimum number of layers per lamp and the

minimum length of exposure which would be effective. Considering the original cost and depreciation of equipment, the replacement cost of bulb and the increase in labor involved in their use, it does not seem that they are, as yet, economic to use. In poultry houses which allow direct sunlight to penetrate into them deeply enough so that all the birds are exposed, a combination of open front and glass substitutes might allow half the vitamin D to be eliminated, provided the minimum requirements are taken care of by the mash. Most commercial and recommended rations for confined birds carry double the minimum requirements as a safety factor.

Vitamin A is scarce and relatively expensive. As a result of conditions already mentioned, plus an unprecedented demand for it for human consumption, vitamin A for fortifying fish oils costs at least double per million units what it did a year ago. As a consequence, poultrymen and feed mixers are giving more careful consideration to this problem. Fortified feeding oils of 3000 U.S.P. vitamin A per gram are often excessively high or off the market and as there is little possibility of suitable high vitamin A potency oils for blending purposes being available soon in quantity a reduction of the potency of fortified oils of 400 vitamin D (A.O.A.C.) potency from the usual 3000 U.S.P. vitamin A units per gram to lower potencies for the duration of the war is indicated. Like many other statements in relation to the vitamin situation, too definite pronouncements cannot be made and some of the lower potency oils may be produced in large enough quantities to change the whole situation. Even under normal conditions, there is no proven need for more than a 2000 vitamin A unitage in commercial mashes when feeds are fed within a week after mixing provided the mash contains the usual levels of yellow corn meal and *alfalfa leaf meal of good quality*. The New England College Feed Conference rations have 5% of alfalfa leaf meal in the starting and breeding mashes and 2.5% in the growing and laying mashes. All the mashes have about 30% ground yellow corn. The writer sees no reason for using other than a 400 D-2000 A oil at the time of writing (Dec. 27, 1941), as the cost per pound of this oil is not enough more than the 1500 or 1000 unit oils to justify the changes in ration which the use of the lower potency oils entail. It is conceivable that these lower potency oils may have to be used, in which case more high quality alfalfa leaf meal or dried cereal grass will have to be added to the mash. Needless to say, the quality of

these sources of carotene becomes of increasing importance as the vitamin A potency of the oils is lowered. It is the gravest mistake to try to economize on alfalfa leaf meal. The *best* is usually the *cheapest* source of protein and vitamin factors.

Some of the poultrymen may be tempted to try to supply the vitamin requirements of their birds by putting alfalfa hay in racks and let the hens pick off the leaves. A recent report from the University of Wyoming showed that when 148 Single Comb White Leghorn hens were fed no cod liver oil or alfalfa meal and were housed in a shed roof house 24 feet deep, only 29 hens survived the test and only 1099 dozens of eggs were laid. With fortified cod liver oil and alfalfa leaf meal in the ration, 106 hens survived and laid 1927 dozens of eggs. Open front houses should not be depended upon in New England to allow sufficient exposure to supply the requirements for vitamin D. Alfalfa hay, when rack fed, and poor quality alfalfa meals are not reliable as sole sources of vitamin A for hens and may be the cause of trouble as supplements.

Some New England poultrymen are cutting Ladino clover and feeding it to their poultry during the growing season. It is a good source of carotene. Grass silage, because of the labor involved, has not been extensively used. These can be fed at the rate of two to four pounds daily. If disease breaks out, the chances are the vitamin A and D requirements are greater and it is a good practice to immediately feed a wet mash containing 1½ tablespoonsful of 400 D-2000 A fortified oil daily for each 100 layers. This should also be done if the mash fed is over two months old.

Poultry keepers can expect to have to pay more for their vitamin protection in their mashes and feed mixers will need to watch the vitamin A sources more carefully. Poor quality alfalfa products and winter sunshine in New England are poor substitutes for cod liver oil. A reliable "Vitamin A and D feeding oil," if intelligently used and supplemented, should meet the present situation very satisfactorily.

Two in One

Brooder House and Range Shelter

Condensed from Kansas Farmer

A PRACTICAL new-type building for chicken raisers is the combination brooder house and range shelter, developed at Kansas State College. As explained by M. A. Seaton, extension poultryman, and W. G. Ward, extension engineer, it combines into one unit of equipment, the recommended features of using a portable brooder house and a range shelter for brooding and rearing chicks.

Many poultry raisers have realized for a long time that range shelters are desirable in developing good pullets for flock replacement. But the cost of a brooder house and a range shelter often is too much for a person's bank account. The combination house is suitable for brooding chicks or poults. After birds are 8 or 10 weeks old, front and back panels can be removed from the building and it can be moved out to a clean location on grass to serve as an ideal range shelter.

Made with light framing, and with plywood for the roof and sides, the combination house is relatively light in weight, considering its size, and therefore is easy to move. The house is 12 feet square and is constructed with a gable roof. Framework consists of 2- by 4-inch floor joists, 2- by 3-inch plates and studs, and 2- by 2-inch framing for the remainder of the building.

The sides and roof are covered with ¼-inch waterproofed plywood and the front and rear panels are bolted to the framework and may be removed. Other material such as galvanized iron may be used when available at less cost. The floor is made of ¾-inch, 15-gauge hardware cloth, supported by 2- by 4-inch joist. Under conditions where it is necessary to reduce the cost of construction, 4 inches of clean gravel will serve for a floor and provide good brooding conditions. This eliminates need of floor joists and wire.

Front and rear of the house are covered with hardware cloth attached to the outside of the framing. Cost of material varies considerably in different localities, but the house can be constructed for about $75 including labor. The cost would be about $60 without labor, or $45 without labor and wire floor.

The brooder house has a capacity of 300 chicks. Perches are provided by using 2- by 2-inch poles extending across the entire house from front to rear.

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Experiences With Hay Mixtures

Condensed from The Rural New-Yorker

C. J. Willard of the Ohio Station makes the following statement about hay mixtures:

The farmer who is looking for the largest yield of high-quality hay year after year will do well to consider alfalfa-clover-grass mixtures instead of straight seedings of any of the three crops.

Nothing would add more to the general hay crop of Ohio than including alfalfa with the long-used and justifiably popular clover-timothy mixture. Although red clover will make some growth with less lime in the soil than will alfalfa, it requires just as much lime to grow really good red clover as to grow alfalfa and any soil which has been limed sufficiently to produce a profitable crop of red clover will also produce alfalfa. Second-year meadows from clover-timothy mixtures result in thousands of acres of straight timothy which would be timothy-alfalfa mixtures, producing two or three times as much hay of better quality, if four to six pounds of alfalfa had been included in the seeding mixture.

Alfalfa is much surer to make a stand in dry seasons than is red clover, but red clover is surer to make a stand in wet seasons. By sowing both, the farmer is much more certain of hay, whatever the season. Legume-grass mixtures are conspicuously freer from weeds than are legume seedings.

A desirable mixture, which has outyielded alfalfa alone or alfalfa or red clover with timothy, is timothy, three pounds per acre if sown in wheat in the Fall, or six pounds per acre if sown in any Spring crop; alfalfa, two to six pounds, six pounds where it is known that alfalfa is successful, smaller amounts where it is less certain; and red clover, six to four pounds, using more red clover as less alfalfa is used. Two pounds of alsike per acre may be added to this mixture, particularly on wet soils and in the northeastern part of the State.

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FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Son, Inc. $4.00.

Beekeeping—By Everett Franklin Phillips, Professor of Apiculture, Cornell University. Published by the Macmillan Co. $4.00.

Breeding Your Own, or Raising Colts for Pleasure and Profit—By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. Macmillan Company. $3.60.

Electricity in the Home and on the Farm, by Forrest B. Wright ($2.75). Published by John Wiley and Sons, Inc.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $1.80.

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Eco., Iowa State Col.; pub. by Collegiate Press. $2.50.

Fruit Crops—By T. J. Talbert, Prof. of Horticulture, Univ. Mo., and A. E. Murneek, Asst. Prof. Horticulture, Univ. Mo. Lea and Febiger. $3.75.

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Review. $2.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, Bu. Animal Industry, 1938, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw, Hill & Co. $4.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. Macmillan Co. $3.75.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $4.00.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Co. $4.00.

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Vegetable Crops—By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. Pub. McGraw-Hill Book Co. $5.00.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

BRIEF BOOK REVIEWS

The Soils That Support Us — By Charles E. Kellogg. Publishers, The Macmillan Company (1941), $3.50.

This book is written for the general reader, the student, or the scientist, who needs to know something about the nature, use, and conservation of soils — who needs a broad view of the whole field. In the preface the author states that "those who have an interest in things that live in the woods or on the open range, in the field or in the garden, are led to study the soil. . . . But beyond its interest as natural history, the soil lies at the very foundation of our existence as cultural beings."

Some Common Diseases of the Horse — By George H. Conn, B.S.A.H., D.V.M. Publishers, Orange Judd Publishing Co., Inc. (1942), $1.50.

This book is an up-to-date and practical treatise on the diseases of the horse. The author emphasizes the early recognition, the causes and prevention of common diseases, and gives brief advice on the nature and treatment of disease, the common ailments and the care and management of horses when sick.

Some Common Diseases of Cattle — By George H. Conn, B.S.A.H., D.V.M. Publishers, Orange Judd Publishing Co., Inc. (1942), $1.50.

This is a practical treatise on the diseases of cattle, giving helpful suggestions and valuable information for the treatment of ills, accidents and disease troubles. It is a book of especial interest to the busy stockman and farmer.

Home Vegetable Gardening — By Charles H. Nissley, Extension Horticulturist in Vegetable Growing. Publishers, Rutgers University Press (1942), $1.50.

Clearly and concisely, this little book will tell you how to grow more than sixty vegetables and herbs. There is a complete discussion of the home storage of vegetables, of seed saving and insect control, and of other features of home vegetable gardening which seldom are included in a book of this type.

Soybeans—Gold from the Soil — By Edward Jerome Dies. Publishers, The Macmillan Company (1942), $1.75.

The complete and colorful story of the soybean from the breeding of varieties, planting and harvesting, down to conversion into edible and industrial products, and the growing of soys in the home garden.

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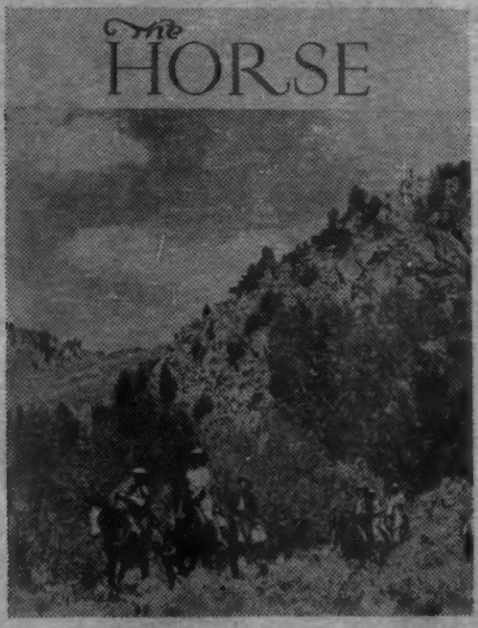

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